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Nuclear Developments

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NUCLEAR DEVELOPMENTS

JPRS-TND-91-006

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SOUTH AFRICA

Government To Sign Nuclear Energy Accord

*MB2403075591 Cape Town CAPE TIMES in English
20 Mar 91 p 5*

[Unattributed report: "Nuclear Agreement Reached"]

[Text] The government has agreed to conclude a comprehensive safeguards agreement with the International Atomic Energy Agency for South Africa's nuclear facilities, the Minister of Foreign Affairs, Mr Pik Botha, said yesterday.

The decision to reach an agreement had been taken "as a demonstration of the government's commitment to adherence to non-proliferation responsibilities and objectives".

Mr Botha was asked in Parliament by Democratic Party foreign affairs spokesman Mr Colin Eglin whether the government had taken a decision to sign the Nuclear Non-Proliferation Treaty.

He replied that the government stated publicly in September last year that it was prepared to accede to the Non-Proliferation Treaty "in the context of an equal commitment by other states in the Southern African region".

"The South African government together with a number of other governments of Southern Africa supports the idea of a nuclear weapons-free zone in the Southern African region," he said.

"The government would also like to see this concept extended to the entire continent of Africa as a nuclear weapons-free zone.

"In this regard it has noted with interest the support for this idea by a number of African states at the Fourth Nuclear Non-Proliferation Treaty Review Conference in Geneva during August-September last year."

Li Peng Stance Against Nuclear Proliferation*OW0104134991 Beijing XINHUA in English
1327 GMT 1 Apr 91*

[Text] Beijing, April 1 (XINHUA)—Chinese Premier Li Peng today reiterated that China will not practice nuclear-proliferation and is against the proliferation of nuclear weapons by any other country.

Li made the remark in a meeting with Director-General Hans Blix of the International Atomic Energy Agency (IAEA), who is here on a four-day working visit as a guest of Jiang Xinxiong, general manager of the China National Nuclear Corporation.

On the issue of non-proliferation of nuclear weapons, Li said China's position is clear-cut, that is, "China won't practice nuclear proliferation. Meanwhile, we are against the proliferation of nuclear weapons by any other country." A Chinese official quoted Li as saying, "in nuclear energy co-operation with foreign partners, we always adopt a cautious and responsible attitude, and have drawn up corresponding policies."

Li, describing China's co-operation with the IAEA as "useful", said China has gained "warm support and help" from the agency since China joined it in 1984.

On China's energy industry, Li said China has abundant hydraulic power and coal resources. Therefore, for some time in the future the country's energy industry will still put stress on the development of hydro and coal resources, with nuclear-power only a supplement.

In developing nuclear power in the next decade, Li said, China will focus on accumulating experience in operation, training of technical personnel and raising the level of localization of facilities and equipment.

China pays great attention to safety in undertaking nuclear power projects, he said. The construction of the Qinshan and Daya Bay Nuclear Power Stations is proceeding well, he said.

In the area of peaceful use of nuclear energy, China will continue to further its friendly co-operation with the IAEA in the future, the Chinese premier said.

Blix described the IAEA's co-operation with China as "very good." He said China's experience in peacefully utilizing nuclear energy is useful for other developing countries.

Now, he said, more and more countries are coming to realize the importance of nuclear energy as an alternative energy source and becoming optimistic about the prospects for nuclear power.

Problems Seen in Restricting Arms Sales*HK0204113191 Hong Kong TA KUNG PAO in Chinese
30 Mar 90 p 4*

["Special dispatch" by U.S.-based staff reporter Wang Renyun (3769 0088 5366): "It Is Not Easy To Restrict Middle East Arms"]

[Text] New York, 29 Mar—Reports say that the Bush administration has proposed a "new order" in the Middle East after the U.S.-Iraq war. Details of this "new order" will be decided after Bush's April visit to the Middle East, but according to what has been revealed, the main points of this proposal will include practicing arms restrictions in the Middle East and forming a collective security organization.

It seems that this "new order" will help ease tension in the Middle East; however, taking account of the history and present state of the Middle East region, it is still questionable whether the proposal on exercising arms restrictions and forming a collective security organization can be realized.

Suspecting and Distrusting Each Other

Viewed from the Israeli leaders' hard-line attitude, the Palestinian issue still remains difficult to resolve. There is little hope even for a smooth settlement of the Israeli-Syrian conflict over the Golan Heights. Apart from Israeli-Arab conflicts, Arab states have to guard against Iraq staging a comeback and take precautions against Syria's and Iran's ambitions. It is not easy to practice arms restrictions when they distrust each other. Members of the so-called collective security organization can only be Arab states in the Gulf region and Egypt; Syria is unlikely to join this organization; Iran and Iraq will be excluded. Any initiative to pull Israel into this organization will meet with strong opposition from Arab states. In a situation of confrontation and as long as Israel, Iran, and Iraq step up their armament, this "collective security organization" will think it necessary to raise its armament level. In addition, through the U.S.-Iraq war, Middle East countries have understood the importance of precision weapons. This will give rise to a large-scale arms upgrading competition.

Viewed from the angle of demand, Middle East countries will purchase a large amount of advanced conventional weapons; viewed from the angle of supply, France, the Soviet Union, Germany, and even Czechoslovakia and Brazil are willing to sell their weapons to Middle East countries. U.S. arms dealers object to imposing restrictions on arms sales to the Middle East on these grounds: If we do not sell, others will all the same! Arms restrictions in the Middle East require the cooperation of arms-exporting countries, but history has proved that Middle East countries can buy weapons as long as they have money. Even some measures of the Bush administration contradict arms restrictions in the Middle East. The following examples will explicitly explain this:

Arms Dealers' Interests

The Bush administration has demanded Congressional approval for U.S. import banks to provide guarantees for commercial bank loans for overseas buyers of U.S. weapons. The amount may be as much as \$1 billion.

Defense Secretary Cheney said that when the United States' Middle East allies are in danger, it will not restrict itself from selling its conventional weapons to them.

The United States is ready to sell 46 F-6 fighter planes and 188 improved Hawk air-defense missiles to Egypt; and 50 F-5 fighter planes to Israel. Saudi Arabia wishes to buy 1,000 armored vehicles (including new generation M-1 and A-2 tanks), a number of Patriot missiles, Apache helicopters, F-5 planes, and air-based radar warning equipment.

Therefore it is hard to believe that the United States intends to bring about arms restrictions in the Middle East. This is because the Bush administration will have to meet the "expectations" of those allies which supported the United States during the U.S.-Iraq war. Conversely, we should not rule out the possibility of the United States trying to strengthen its influence among its allies through arms sales. Pressure from U.S. arms dealers is one of the reasons that make the Bush administration allow arms sales to the Middle East. U.S. arms dealers such as General Dynamics, McDonnell Douglas, Lockheed, Northrop, and Kuhlman are good at peddling their ideas. The United States has reduced its military expenditure. If these arms dealers cannot get huge orders from abroad, many of their production lines will have to be stopped.

If I Do Not Sell, Others Will Sell All the Same

In the political and economic fields, there is still heavy pressure which will force the Bush administration to sell weapons to Middle East countries. Bush once expressed the hope of reducing arms sales to the Middle East but has never taken effective measures to weaken the flow of arms to this region. Instead he took the lead in selling a large amount of advanced conventional weapons to the Middle East. Under such circumstances, it is hard to imagine that other arms-exporting countries will be willing to limit their arms sales to the region, the reason being this: If we do not sell, the United States will sell all the same!

Plans for 2d Nuclear Plant in Guangdong Stated

HK2603102891 Hong Kong SOUTH CHINA
MORNING POST in English 26 Mar 91 pp 1, 9

[By Chris Yeung and Keng Chen in Beijing]

[Text] China's Minister of Energy Resources, Mr Huang Yicheng, yesterday assured Hong Kong that its doubts about nuclear safety would be considered when Beijing picks the site for Guangdong's second nuclear power plant.

Speaking about Beijing's plans to build a second nuclear facility in the region, Mr Huang said nuclear power plants were safe and that Hong Kong people had no cause for worry even if a second reactor were built next to the one in Daya Bay.

"The central government supports Guangdong's plan to build its second nuclear power plant because the province has no coal," he said after a session of the National People's Congress (NPC).

"The problem for Guangdong is that it has no funds for the second plant, which will cost several billions of dollars. They have to study how to attract foreign investment.

"They have yet to submit their plan for a second plant. If they've got enough money, we will agree to it," he said.

Mr Huang said he understood the fears of Hong Kong people over the Daya Bay power plant, which is near the territory's border.

"I have told them it would be better if they build the second plant farther away from Hong Kong because it will have some psychological impact."

But he maintained that there would not be any real danger, citing many nuclear power plants and reactors in Germany and France were also near city centres.

"Hong Kong people should go and have a look at the plants in other countries so that they could put their minds at ease."

Mr Huang revealed that he had visited Guangdong in December and discussed with officials their nuclear power plans.

He said Guangdong authorities were still undecided on the three possible sites at Daya Bay, Yangjiang and Taishan.

Mr Huang said nuclear power plants should not be built far away from users, but within a distance of 800 kilometres.

"I have no personal view on the choice of the site. We'll wait for their submission."

Faced with a severe shortage of electricity, Guangdong plans to greatly boost its coal-fired and hydro-electric facilities in the decade.

Provincial officials have earlier indicated that funding on the building a second nuclear power plant could be lowered if some infrastructure facilities at the present Daya Bay site such as transport and pier could be used.

Mr Huang added that the province still faced a tight budget, and that even some coal-fired electricity projects had been put on hold because of the lack of funds.

But the Reverend Fung Chiwood, spokesman for the Hong Kong-based Joint Conference for the Shelving of

the Daya Bay Nuclear Plant, said Mr Huang's remark would further erode local confidence.

"Already many people have left the territory because of Daya Bay, I believe more will go if China really builds another nuclear plant there," he said.

"This is definitely no good to local confidence," he added.

He also questioned the financial feasibility of the project since China is in an economic recession.

"I would question how they could raise the money if they are not going to sell the electricity generated to Hong Kong. I expect that they will have problems in raising loans from foreign bankers," he said.

Mr Fung said the joint conference would continue to lobby local politicians to prevent the construction of another nuclear plant in Daya Bay.

He said they would meet Legislative Councillors and NPC local members to express their opposition.

Meanwhile, the governor of Hubei, Mr Guo Shuyan, said yesterday the controversial Three Gorges hydro-electric project along the Yangtze River had already begun, although the State Council had yet to give its final approval to the multi-billion-yuan scheme.

He said pilot works involving the resettlement of several thousand people affected under the mega-project had started and proven a success. Nearly one million people would have to be removed to new homes along the Yangtze River.

Mr Guo said they expected the plant, whose total investment is estimated at 50 billion yuan (HK\$74.65 billion), to begin operation between the year 2003 and 2005.

The remarks by Mr Guo were the clearest sign that the project would be given the final approval after years of debate.

He said they expected the NPC to give its stamp of approval in next year's plenary session.

"The major problem now is to find enough money for the project," he said.

Mr Guo also dismissed fears among opponents that the building of the 185-metre dam and massive flooding of the area would wreak irreparable damages to the environment of the scenic river and provinces including Sichuan and Hubei.

"The environmental impact is not so great," he said.

He said the population affected would also be resettled in nearby counties.

INDONESIA

McDonnell Douglas Selected To Launch Satellite

BK0904073691 Jakarta Domestic Service in Indonesian
0600 GMT 9 Apr 91

[Text] Indonesia has decided that its Palapa B-4 satellite will be launched aboard a U.S. Delta rocket manufactured by the McDonnell Douglas aircraft company. The cost of launching the Palapa B-4 satellite has been estimated at \$44 million.

In a press statement issued in Bandung yesterday, Chachuk Sudaryanto, first director of Perumtel, said that three companies which had offered their services to launch the Palapa B-4 satellite met the desired conditions. After making a thorough evaluation of the administrative, technological, and economic aspects, the Delta rocket was finally chosen to launch the satellite.

Two other industrial concerns that had offered their services to launch the Palapa B-4 satellite were the China Great Wall Industry with its March-3 rocket and France's Ariane Space Industry with its Ariane rocket.

According to Chacuk Sudaryanto, the Palapa B-4 satellite is scheduled to be launched in March 1992.

JAPAN

Tokyo To Acquire, Produce U.S. Missile System

OW2903073991 Tokyo KYODO in English 0730 GMT
29 Mar 91

[Text] Tokyo, March 29 KYODO—Japan and the United States recently completed negotiations on Japan's acquisition and production of the Rim-7M Sparrow missile systems, used widely by the U.S. and its allies, the Foreign Ministry said Friday.

The governments also renewed agreements, concluded in March 1989 and March 1990, to acquire and produce the UH-60J rescue helicopters, a ministry release said.

Foreign Minister Taro Nakayama and U.S. Ambassador to Japan Michael Armacost exchanged notes Friday in Tokyo noting the final accords, the release said.

Ministry officials said the Sparrow air-to-air guided missile system, used by the U.S. Air Force and U.S. Navy, is considered necessary to strengthen Japan's defense capabilities.

The helicopters will be acquired and produced for the Japanese Air Self-Defense Force, the release said.

DPRK Ready To Accept Nuclear Inspections

OW0804123191 Tokyo KYODO in English 1221 GMT
8 Apr 91

[Text] Tokyo, April 8 KYODO—North Korea is ready to conditionally accept an international pact calling for

inspection of nuclear facilities capable of producing nuclear weapons, the chief of a North Korean delegation said Monday.

Chong Chun-ki, chairman of the Korean Committee for Cultural Relations with Foreign Countries, indicated North Korea's position in an interview with KYODO NEWS SERVICE.

A safeguard measure against nuclear weapons through the International Atomic Energy Agency (IAEA) is one of the key issues pending in normalization talks between Tokyo and Pyongyang.

In the interview, Chong said there are 1,000 U.S.-made nuclear weapons in South Korea posing a direct threat to the North, and reiterated Pyongyang's stance that nuclear arsenals in the South should also be opened up to IAEA inspection.

The former vice premier balked at Seoul's bid for single membership to the United Nations, saying the South Korean move is adversely affecting inter-Korean prime ministerial talks, currently deadlocked.

Chong also said Pyongyang will soon present a new plan for the reunification of Korea.

He said the Japan-North Korea talks aimed at normalizing their relations are progressing in a friendly atmosphere, and hoped they would produce favorable fruits.

Chong, currently vice chairman of the Foreign Affairs Committee of the parliament, is visiting Tokyo as the first former North Korean vice premier to do so.

SOUTH KOREA

Talks With USSR on Peaceful Use of Nuclear Power

SK2503073491 Seoul YONHAP in English 0712 GMT
25 Mar 91

[Text] Seoul, March 25 (OANA-YONHAP)—South Korean and Soviet officials began a consultation on the peaceful use of nuclear power at the Science and Technology Ministry in Seoul Monday.

During the four-day meeting of the first Korea-USSR Coordination Committee on Nuclear Energy, the two sides will discuss the promotion of joint nuclear research projects, Korea's participation in the International Center for Chernobyl and other matters concerning the peaceful use of atomic energy.

Vice Science and Technology Minister So Chong-uk leads the Korean delegation, and Boris Nikipelov, first deputy minister of atomic power and industry, heads the Soviet team.

The Soviets also will visit a nuclear power plant in Kori and industrial facilities such as the Suwon factory of Samsung Electronics Co. and Hyundai Motor Co. in Ulsan.

Accord on Soviet Nuclear Waste Disposal Methods

SK2803063691 Seoul YONHAP in English 0512 GMT 28 Mar 91

[Text] Seoul, March 28 (YONHAP)—Soviet technology for disposing of nuclear and industrial waste in caves may soon be imported by South Korea under an agreement between Korea Trade Leader Co. and an unnamed Soviet research institute.

Officials of the trading company said Thursday they had already initialed an agreement with the research institute to acquire the know-how to create approximately 1,000 subterranean chambers of one cubic meter each for nuclear and industrial waste.

The officials declined to name the institute, saying details of the deal would be announced after the company had submitted a technology import plan to the Science and Technology Ministry early next month.

One official said the institute had recently gone private. The company also refused to say how much money was involved.

The Soviet method has proven successful and came into wide use after the Chernobyl accident, they said. It involves locating a geological structure containing sand 350 meters to 500 meters below the surface and then creating a cave in it with a controlled explosion.

The blast turns the sand into a hardened substance that is leakproof, the officials said.

Such projects require only small surface area, no more than 10 meters square, and uninhabited islands off the west coast have geological features that make them possible sites for such waste dumps, they said.

The caves could hold dangerous industrial or radioactive waste, they said.

The government scrapped plans to construct a temporary nuclear dump site on Anmyondo, a small island off the west coast, last November after violent protests by residents.

Ministry Considers USSR Joint Nuclear Project

SK1104005791 Seoul THE KOREA TIMES in English 11 Apr 91 p 3

[Text] The Science Technology Ministry is considering including the issue of the joint development of small-size nuclear reactors in the agenda of the Korean-Soviet science ministers meeting slated for May in Moscow.

According to sources at the ministry yesterday, Soviet officials want to accelerate technological cooperation in the field of nuclear energy and the reactor project would be a good means of spurring this effort.

The Soviet Union is seeking to upgrade and sophisticate the small-size reactors they now use in nuclear-powered submarines for commercial use and wants Korea to subsidize the project partly, the sources said.

North Korea's Nuclear Potentials Analyzed

SK0304075691 Seoul CHOSON ILBO in Korean 1 Apr 91 p 4

[Article by reporter Kim Hyo-chae, entitled "North Korea's Nuclear Potentials"]

[Excerpts] [Editor's Note] The nuclear issue on the Korean peninsula has emerged as a matter of international interest. Intelligence organizations of the West, including the United States, judged that North Korea is completing facilities capable of mass production of nuclear weapons in a few years. The Soviet Union proposed that North Korea discard its attempt to produce nuclear weapons and the Korean peninsula be denuclearized by withdrawing nuclear weapons of U.S. troops which are believed to have been deployed in South Korea. It has been learned that the authorities of U.S. Armed Forces in the ROK and some of the ROK military are carefully reviewing the issue of so-called preventive bombing aimed at destroying North Korea's nuclear facilities in advance. North Korea's nuclear armament will bring enormous effects in strategic environment in Northeast Asia. What is the degree of nuclear threat on the Korean peninsula? Views of experts on the nuclear question on the Korean peninsula, which is being briskly discussed after the end of the Gulf war, are presented here. [end editor's note]

The Status of Nuclear Facilities:

Military experts are of the opinion that North Korea will have a mass production system for nuclear weapons by the mid-nineties. An American military intelligence expert who visited Japan late last year warned that judging from pictures taken by military satellites and other intelligence sources, North Korea will complete a mass production system for nuclear weapons by 1995 or 1996. According to pictures taken by military satellites, the nuclear power station in Yongbyon is divided into a research-purpose nuclear reactor; small-size nuclear reactor; large-size nuclear reactor; enriched uranium plant and redisposal facilities of nuclear fuel. [passage omitted]

What constitutes a problem is the large-size nuclear reactor which is expected to be completed and to begin operation around 1994. North Korea began to build this reactor in 1984 after the model of an old French reactor. Its capacity is known to be from 50 to 200 megawatts.

Experts are of the view that when this reactor is completed, the annual production of plutonium will be approximately 18 to 50 kilograms with which two to five nuclear weapons can be produced. In addition, when the redispersion plant for nuclear fuel is completed in 1995 and begins operation, North Korea will have the mass production system of nuclear weapons in 1996, a year later. The reason of regarding the nuclear research complex in Yongbyon as a nuclear weapons manufacturing plant by experts is that there is no facility in this complex which can be considered power generation facilities. [passage omitted]

The possibility of North Korea's nuclear armament is expected to give enormous impact to security order in Northeast Asia. Needless to say, the target place of such impact is the ROK. It is an inevitable order that voices calling for developing countermeasures will immediately resound from the ROK military when North Korea is confirmed to have a mass production system for nuclear weapons. Deployment of nuclear weapons in the ROK has not been officially confirmed even once up to now. The United States is adhering to the policy of neither admitting nor denying the existence of nuclear weapons. Deployment of nuclear weapons in the ROK was raised merely by civilian experts on military affairs and by retired U.S. generals who once served in Korea.

North Korea's nuclear armament will instigate the military expansion of Japan.

Even Taiwan, which began to develop nuclear weapons nearly at the same time with the ROK but suspended due to the U.S. pressure, will again attempt to develop.

Countermeasures:

Measures to check North Korea's nuclear armament can be categorized into the following three points: First is the step for denuclearization of the Korean peninsula.

The Soviet Union takes denuclearization of the Korean peninsula as its official position. Military experts in the United States and in the ROK and some Congressmen support this step. [passage omitted]

Those who support denuclearization of the Korean peninsula put forward an important precondition. That is: North Korea should agree with nuclear inspection by the International Atomic Energy Agency [IAEA] and should suspend development of nuclear weapons. North Korea signed the IAEA's nuclear safety agreement in 1985.

However, North Korea refused IAEA's field inspection, which is an essential step for it to take, even after signing this agreement. Because of such an attitude by North Korea, the ROK and U.S. Governments are opposed to the policy of denuclearization.

The second measure for checking North Korea's nuclear armament is to resolve international sanctions. Doctor (Loren Sheyman) from Cornell University in the United States held that the United Nations should adopt a strong resolution demanding suspension of North Korea's nuclear development with such intensity and logic as it applied when adopting a resolution for strong sanctions against Iraq's invasion of Kuwait.

The third step is to destroy the nuclear facilities in Yongbyon by bombing before they are completed.

When ROK reporters visited the United States in July last year at the invitation of the U.S. Information Agency, some relevant officials in Congress and the military did not deny such a possibility, even in a limited manner.

A certain official in the Military Affairs Committee of the U.S. Senate said that "in the event that North Korea comes to have nuclear weapons in defiance of international opposition, preventive bombing would be possible." High-ranking officers in the U.S. Armed Forces Pacific Command expressed their agreement with this opinion.

It was learned that the U.S. forces in the ROK seriously considered this issue in actuality, and worked out a detailed operational plan for this. A pertinent military official revealed that "the preventive bombing is one of many scenarios which will be put into consideration when all diplomatic and political efforts for checking North Korea's nuclear development come to naught."

An expert on military strategy is of the opinion that the possibility of preventive bombing is not great.

North Korea's nuclear development appeared to be a counterstrategy against U.S. forces in the ROK. Thus, the possibility of North Korea's using this strategy as a multipurpose card for direct negotiations with the United States is great.

This expert stressed that "the situation on the Korean peninsula to be crowded with nuclear weapons is not desirable. Now is the time for the government to carefully review the measures for denuclearization of the Korean peninsula in a forward-looking manner."

BULGARIA

Kozloduy Nuclear Plant Dismisses Soviet Experts*AU2603184391 Sofia DUMA in Bulgarian
20 Mar 91 p 2*

[Report by Iliya Borisov]

[Text] Kozloduy, 19 March—The last group of Soviet experts who were working on bringing on line the sixth reactor of the Kozloduy Nuclear Power Plant, have left the country. As Engineer Zakhari Boyadzhiev, chairman of the Nuclear Power Economic Association in Kozloduy, said, the release of the Soviet experts was necessary because the nuclear power plant is incapable of paying them monthly wages amounting to \$4,000 that the Soviet side demands as of 1 April 1991. For this reason, the agreement with the Soviet experts has been canceled.

Well-trained Bulgarian teams will now be entrusted with bringing the No. 6 power unit on line, as well as controlling its operations. Because there are only 22 trained specialists in charge of two reactors at present, the second reactor will be put into operation by the end of April, or in mid-May—that is to say with an approximately one month delay of the initial deadline.

Government To Draft Nuclear Accident Plan*AU1104091291 Sofia BTA in English 2124 GMT
10 Apr 91*

[Text] Sofia, April 10 (BTA)—By the year's end Bulgaria will have a national plan for protection of the population in the event of an accident at the Kozloduy nuclear power plant, meeting international standards and the IAEA [International Atomic Energy Agency] requirements. Ecologists and the general public have been particularly sensitive about nuclear safety.

The decision to draw up the plan was made by a government commission which met today to consider the results of a two-day command-post civil defence drill based on a scenario simulating an accident at the Kozloduy Nuclear Power Plant which results in radioactive contamination of the entire country.

Judging by the results of the drill, the civil defence system has satisfactory readiness to cope with a nightmarish option like that by standards which the commission's chairman Mr. Aleksandur Tomov described as "East European."

Indicatively, the three tonnes of potassium iodide, needed for iodine prophylaxis of all Bulgaria in the event of radioactive contamination, proved "missing" as the competent ministry just intended to import the stuff if necessary.

Mr. Tomov, who is deputy prime minister, said that Bulgarian scientists have developed specialized food and forages absorbing radionuclides which meet and even

surpass world standards, but they are gathering dust in various safes because they are regarded as "top secret." They must be declassified and used sensibly, Mr. Tomov believes.

Prof. Bonchev, head of the Atomic Physics Department at Sofia University, dismissed as speculation the publications which describe the situation in the plant as tragic. There have been reports that the Kozloduy N-Plant is on the "brink of disaster." There is no such thing. The plant functions normally and we don't expect any accidents, the expert said. Together with his colleagues he conducted a several months long study of the operation of the plant.

Prof. Bonchev, however, welcomed the special mode of operation introduced by the government for the four old Soviet-built VVER-400 reactors. Under this mode of operation, the staff manning the reactors will get pay rises along with higher responsibilities, including criminal liability, for the trouble-free operation of the plant, a storage facility for nuclear waste will be built and other safety measures will be taken.

Bulgaria will count on international financial support for making Kozloduy safe by international standards, "a problem with transboundary implications," as Mr. Tomov described it. He stressed Sofia's desire to work seriously and responsibly to guarantee the safe operation of the Kozloduy plant. In May the Civil Defence will hold a nationwide exercise to test reaction to a nuclear accident there. Also in May, experts of the International Atomic Energy Agency will hold a special seminar to familiarize Bulgarian experts with the IAEA requirements for the safe operation of nuclear power plants.

Consequences in Bulgaria of Chernobyl Accident*AU1604074091 Sofia BTA in English 2006 GMT
15 Apr 91*

[Text] Sofia, April 15 (BTA)—The culpable silence kept over the Chernobyl accident of April 1986 and the underestimation of its consequences may have some tragic effects on Bulgaria's population which will become apparent in the next 50 years. This is one of the theses of the indictment presented at today's opening of the trial of two of the main culprits for the failure to adopt the necessary safety measures to protect the population and for underestimating the possibility for a secondary contamination of people and animals.

So far there are no concrete medical observations, but an abrupt rise in the incidence of malignant diseases may be expected.

The high-ranking state officials of the former regime Grigor Stoichkov and Professor Lyubomir Shindarov will be held responsible for their culpable actions and inaction in the months following the Chernobyl accident.

This was how events developed in Bulgaria after the accident. Measurements were started on April 30, 1986 when it was already known that the cloud would pass over Bulgaria's territory, which actually happened on the night of May 1 to May 2. The samples taken by the Central Hydrology and Meteorology Department with the Bulgarian Academy of Sciences then showed a great rise in radioactivity. The data surpassed the usual values from several hundred to several thousand-fold.

Then drinking water began to be monitored and the first "hot particles" were detected on May 5. On May 8 their concentration exceeded the admissible norms thousands-fold.

Measurements, taken on a mountain peak on May 3, showed an on-ground contamination of up to 120,000 Becquerels per square meter. In May on-ground contamination in southern Bulgaria ranged between 340 and 1,700-fold the usual values and in northern Bulgaria between 90 and 1,400-fold.

Some fifteen radionuclides were discovered in the different samples: iodine 131 and 132, caesium 134, 136, 137, strontium, barium and others.

On May 5 the Central Laboratory of Radioactive Protection and Toxicology established that the radionuclides in sheep's milk exceeded the admissible concentration of 500 Becquerels per litre 79-fold.

In a sample of milk the Sofia University experts measured a concentration of up to 150,000 Becquerels per litre.

But almost no measures were taken to protect the population. Precaution measures were taken only in the Army. Examinations made in the town of Sliven (southern Bulgaria) showed that the concentration of iodine in the thyroid gland of soldiers was ten times lower than that in the case of schoolchildren and adults.

Secondary radioactive contamination began late in 1986 when farm animals began to be fed with contaminated fodder.

At the beginning of May 1986, the caesium measured in men of the 19-30 age-group was up to 7.7 Becquerels per kilo. In March-April the following year it had increased to 320 Becquerels as a result of the intake of contaminated foodstuffs.

According to UN data Bulgaria ranked 11th among the European countries contaminated after the Chernobyl accident. But through the action or inaction of the Bulgarian authorities now Bulgaria tops the list by the iodine content in the thyroid glands of her population and by its caesium radioactive contamination.

This folly has a material expression, too. The economy suffered damages to the tune of more than 2 million and 600 thousand leva. But the other damages are immeasurable....

HUNGARY

Nuclear Regulatory Structure: Function, Authority

91WP0072A Budapest MAGYAR KOZLONY
in Hungarian No 126, 15 Dec 90 pp 2433-2436

[Administration Decree, No. 104 of 15 December 1990 on the functions and jurisdiction of the National Nuclear Energy Committee and of the National Nuclear Energy Office]

[Text] Based on authority granted in Paragraph 27 of Law No. 1 of 1980 concerning nuclear energy, and as a matter of fulfilling the obligation specified by that law, the administration establishes the functions and jurisdiction of the National Nuclear Energy Committee (hereinafter: OAB) and of the National Nuclear Energy Office (hereinafter: OAH) as follows:

Paragraph 1

The OAB is an advisory organization to the government relative to the peaceful use of nuclear energy. In this capacity the OAB reports its views on matters within its scope, coordinates and performs the functions of an authority, and acts as a control organization.

Paragraph 2

In the framework of its advisory and reporting function the OAB:

a) Monitors general developmental trends in the use of nuclear energy both in Hungary and abroad. Based on this activity, the OAB prepares informative publications and studies, and makes recommendations to prepare governmental decisions.

b) Comments on proposals and suggestions submitted by ministries and by organizations of a national scope concerning the peaceful use of nuclear energy.

Paragraph 3

In its capacity of an organization which coordinates the functions of authorities, the OAB streamlines:

a) The establishment, start-up, operation, renovation, shutdown, and control of facilities related to the peaceful use of nuclear energy.

b) The manufacture and importation of equipment to be used in these facilities.

c) The production, use, storage, and transportation of fissile and radiant materials.

d) All activities related to protection against radiation and to nuclear security under the jurisdiction of other ministries and organizations of a national scope, as provided for in separate law.

Paragraph 4

In the framework of performing its functions as an authority, the OAB:

Grants licenses for the establishment, start-up, operation, renovation, and shutdown of nuclear power plants, based on permits granted by other authorities, as required in separate law.

Paragraph 5

In the interest of performing its functions, the OAB cooperates with all ministries and organizations of a national scope involved in the peaceful use of nuclear energy. The OAB informs the public about proposals and decisions related to the use of nuclear energy.

Paragraph 6

The OAB streamlines research and technical development work related to the safe use of nuclear energy, and directs state research and development programs related to nuclear security.

Paragraph 7

1. In the framework of its authority to perform control functions, the OAB monitors:

a) The peaceful use of nuclear energy within the national economy.

b) The enforcement of legal provisions and the exercise of authority relative to the use of nuclear energy.

2. In the interest of performing its control functions, the OAB may examine, or may request information from divisions involved in the peaceful use of nuclear energy.

3. Based on findings resulting from the exercise of control functions, the OAB initiates practical measures, calls the attention of leaders of ministries, organizations of a national scope and of other organizations to needed changes in prescriptions and official requirements, and in each case reports to the administration the related findings.

Paragraph 8

The OAB maintains relations with international and regional organizations which deal with the peaceful use of nuclear energy; develops and maintains bilateral and multilateral international relations within the area of its jurisdiction. The OAB coordinates Hungarian participation in the work of the International Atomic Energy Agency and Hungary's performance on requirements stemming from international cooperation. Based on authority granted in other law and on obligations flowing from such authority, the OAB provides for the implementation of bilateral and multilateral international agreements, in cooperation with concerned ministers and the leaders of organizations of a national scope.¹

Paragraph 9

The OAB is composed of a chairman appointed by the prime minister, of deputy chairmen, as well as of leading office holders appointed with the concurrence of the OAB chairman by the minister of the interior, the minister of agriculture, the minister of defense, the minister of industry and commerce, the minister of environmental protection and regional development, the minister of transportation, communications and waterways, the minister of international economic relations, the minister of public welfare, the finance minister, the chairman of the National Technical Development Committee [OMFB], and by the executive secretary of the Hungarian Academy of Science [MTA], and further, of professionals appointed by the OAB chairman.

Paragraph 10

The Technical Scientific Council [MTT] serves as the advisory organization to the OAB. The Council's chairman shall be appointed by the Chairman of the OAB. The MTT also serves as the Technical Scientific Council to the Government Commission for the Prevention of Nuclear Accidents, established by cabinet determination 135-MT of 22 December 1989.

Paragraph 11

The chairman of the OAB:

a) Defines tasks stemming from the implementation of Decree with the Force of Law No. 12 of 1970 concerning the proclamation of an agreement to prevent the proliferation of nuclear weapons, and from Decree with the Force of Law No. 9 of 1972 concerning the proclamation of an agreement between the Hungarian People's Republic and the International Atomic Energy Agency relative to safeguards pursuant to the agreement to prevent the proliferation of nuclear weapons.

b) Defines and enforces the domestic system for the recording and control of fissile and radiant materials.

c) Defines technical requirements for the security of the establishment, start-up, operation, renovation, and shutdown of nuclear facilities, and of the manufacture and importation of equipment which constitute component parts or accessories in such facilities.

d) Provides for the performance of cooperative and informational functions related to the prevention of nuclear accidents.

Paragraph 12

1. The OAH is a state administrative organization of a national scope directed by the chairman of the OAB. The OAB chairman acts through the OAH regarding state administrative matters under his jurisdiction.

2. Authority of first instance regarding nuclear security technology matters delegated under the jurisdiction of the OAH shall be exercised by the Nuclear Security

Technology Superintendence. The Nuclear Security Technology Chief Superintendence shall exercise authority of the second instance. Other organizational units of the OAH shall act with respect to other state administrative matters under OAH's jurisdiction.

3. The OAH also acts as the secretariat for the OAB.

4. The head of the OAH and his deputy, as well as the heads of the Chief Superintendence and of the Superintendence shall be appointed by the chairman of the OAB.

Paragraph 13

Within the scope of its official authority the OAH:

a) Issues security technology licenses needed for the establishment, start-up, operation, renovation, and shutdown of nuclear facilities and for the manufacture and importation of equipment which constitute component parts or accessories in such facilities.²

b) Issues licenses for the exportation of nuclear materials.³

c) Approves the packaging of radioactive materials, and takes action regarding individual instances which involve the recording and control of radioactive and nuclear materials. These functions shall be performed pursuant to cabinet decree 75-MT of 31 October 1988 which authorized the MTA Isotopic Research Institute to perform state administrative functions.

Paragraph 14

In agreement with ministers and heads of organizations of a national scope which perform supervisory functions, the OAB chairman may utilize the services of suitable research institutes and other institutions for the preparation of official decisions and for controlling the enforcement of requirements.

Paragraph 15

The OAB and the OAH operate as a separate cost center within the OMFB budget.

Paragraph 16

The OAB shall establish its own rules and regulations. Rules and regulations for the MTT, and the organizational structure and operating rules of the OAH shall be established by the chairman of the OAB.

Paragraph 17

The minister having authority to oversee the OAB is hereby authorized to determine in agreement with the ministers involved and with the OAB chairman:

—the amount of fees to be paid, and conditions for the payment of fees to institutes and institutions for services rendered in the exercise of OAH's official authority, and

—conditions for the payment of fees by users and by organizations involved in the use of nuclear energy to the OAH for its functioning as an authority.

Paragraph 18

1. This Decree takes effect on 1 January 1991.

2. The following provisions shall lose force on the effective date of this Decree:

a) cabinet resolution No. 1023-MT of 4 July 1978 concerning the functions and jurisdiction of the National Nuclear Energy Committee, and

b) Paragraph 23, Section (2) and the second sentence of Paragraph 29 of cabinet decree No 12 of 5 April 1980 (hereinafter: Vhr. [abbreviation unknown]) concerning the implementation of Law No. 1 of 1980 concerning nuclear energy.

3. On the effective date of this Decree

a) Paragraph 23, Section (1) of the Vhr. shall be changed as follows:

“(1) Regarding nuclear facilities

“(a) determination of the contents of the technical plan,

“(b) determination of security technology requirements concerning their establishment, start-up, operation, renovation, repair, shutdown, and further regarding the manufacture and importation of equipment to be used,

“(c) the licensing of security technology required for their establishment, start-up, operation, renovation, and shutdown, and further, for the manufacture and the importation of equipment which constitute component parts of accessories within nuclear facilities shall be under the jurisdiction of the OAB chairman.”

b) In Paragraph 24 of the Vhr. the partial text “the committee composed of representatives of ministers (leaders of organizations of a national scope) chosen by the Cabinet” shall be replaced by the wording “the OAB”; the designation of Paragraph 28 shall be changed to Paragraph 28, Section (1); at the same time Paragraph 28 shall be amended by adding Section (2) with the following text:

“(2) In applying Paragraph 20, Section (3) of the law, the extent of indemnification shall be determined by the cabinet, in the context of international agreements and of mutuality.”

c) Whenever the Heavy Industry Ministry Decree No. 5-NIM of 31 March 1979 concerning nuclear power plant security technology issues mentions the term “State Energetics and Energy Security Technology Superintendency,” this should be understood to mean the “Nuclear Security Technology Superintendency of the OAH”, and whenever the text mentions “Heavy

Industry National Energy Management Authority," this should be understood to mean the "Nuclear Security Technology Superintendency of the OAH."

d) In Paragraph 1, Section (2), point (c) of Cabinet Decree No. 75 of 31 October 1988 authorizing the MTA Isotopic Research Institute to perform state administrative functions, the term "Secretariat of the National Nuclear Energy Committee" shall be replaced by "OAH."

e) In Paragraph 3, Section (1) of Cabinet Decree No. 2-MT of 19 January 1986 the term "National Nuclear Energy Committee" shall be replaced by "OAH."

f) In Industry Ministry Decree No. 4-IpM of 30 March 1983 concerning nuclear power plant safety zones, the term "State Energetics and Energy Security Technology Superintendency" shall be understood to mean the "Nuclear Security Technology Superintendency of the OAH."

Footnotes

1. Agreement concerning the prompt announcement of nuclear accident as proclaimed in Cabinet Decree No. 28-MT of 9 August 1987.

—Agreement concerning assistance to be provided in case of nuclear accidents or radiation emergencies as proclaimed in Cabinet Decree No. 29-MT of 9 August 1989.

—Agreement concerning the physical protection of nuclear materials as proclaimed by Decree with the Force of Law No. 8 of 1987.

—Agreement concerning tort liability under civil law as proclaimed in Cabinet Decree No. 24-MT of 7 February 1990.

2. For implementing provisions see Heavy Industry Ministry Decree No. 5-NIM of 31 March 1979 concerning nuclear power plant security technology issues, and Industry Ministry Decree No. 4-IpM of 30 March 1983 concerning nuclear power plant safety zones, as well as instructions issued by the chairman of the OAB, and joint instructions issued by the chairman of the OAB and the executive secretary of the MTA concerning nuclear security and security technology issues of critical and subcritical nuclear systems, and of research and educational nuclear reactors.

3. See: Cabinet Decree No. 2-MT of 19 January 1986 concerning the exportation of nuclear materials.

POLAND

Dubinín Confirms Nuclear Weapons Withdrawn

LD0904075291 Warsaw Domestic Service in Polish 0600 GMT 9 Apr 91

[Text] An important matter at the center of attention in today's papers is the withdrawal of Soviet forces from Poland. The papers carry reports on a news conference by General Viktor Dubinín, commander of the Soviet Forces Northern Group.

To the question from RZECZPOSPOLITA on whether he can unambiguously and authoritatively contradict that chemical and nuclear weapons are now or have in the past been located on Polish territory, the Soviet general replied: I firmly state that there are not and have not been chemical weapons in Poland. In accordance with Poland's wishes, in April there will be an announced inspection of (?two) Soviet units. We can make more of our units available for inspections. As to nuclear weapons, as there were missile units then there were also nuclear weapons. All of the nuclear weapons were transported out of Poland in the first half of 1990. This is, stresses RZECZPOSPOLITA, the first public Soviet statement confirming the existence in the past of nuclear weapons on Polish territory, in bunkers near Pniewo, which is only a few kilometers from Borne-Sulinowo where ceremonies associated with the withdrawal of a Soviet missile unit will take place today. The title of the article is: There Were Nuclear Weapons in Our Country.

Experts Say Former Soviet Base Radiation-Free

LD0504144991 Warsaw PAP in English 1329 GMT 5 Apr 91

[Text] Pila, April 5—Polish experts inspected the area evacuated by a special unit of the Soviet Army in Sypniewo, northwestern Poland, and found no radioactive contamination of the military objects. Specialists also took samples of local water, soil, dust, and the surfaces of the examined objects for analysis. The results will be known two weeks from now.

Possible Storage of Warheads To Be Investigated

LD2803173991 Warsaw TVP Television Network in Polish 1615 GMT 28 Mar 91

[Text] The chairman of the State Atomic Energy Authority has issued an instruction that urgent radiological tests be carried out in the Soviet Army training grounds in Pila voivodship. This is in connection with reports about the possible storage there of nuclear warheads.

ARGENTINA

Germany To Finance Construction of Nuclear Plants

PY1004195791 Madrid EFE in Spanish 1006 GMT
10 Apr 91

[Text] Bonn, 10 Apr (EFE)—A spokesman for the German consortium Siemens today confirmed to EFE that the projects to finance final construction of the Atucha-2 nuclear plant and modernization of the Atucha-1 nuclear plant have almost been completed.

The consortium has obtained a "Hermes credit" totalling 200 million Deutsche marks (about \$120 million), of which 50 percent was guaranteed by the state [not further specified] to finance Argentina's contribution to end construction of the Atucha-2 nuclear plant. This credit was granted under the condition that Argentina will include a similar amount in its budget for the same purpose.

The Siemens spokesman said that the financing of German exports for the Atucha-2 plant was previously assured.

The German Government also granted another "Hermes" credit totalling 100 million Deutsche marks (about \$60 million) for reconstruction of the Argentine power plant network. The Argentine Government has submitted a proposal to allocate 55 percent of the second credit to modernize the Atucha-1 nuclear plant and 45 percent to the San Nicolas thermoelectric plant.

Besides the loans approved for implementation of the electrical energy projects, Argentina has also obtained a "Hermes" credit line totalling 200 million Deutsche marks (\$120 million) that was granted without any sectorial specification. This credit, which covers German exports to Argentina, has not been completely used thus far.

According to a German Economy Ministry spokesman, the increase in "Hermes" credits have not been discussed during President Menem's current visit to Germany, nor during the 9 April talks between Argentine Economy Minister Domingo Cavallo and German Deputy Economy Minister Dieter von Worsen.

BRAZIL

Defense Industry Opposes Arms Deal With U.S.

PY1104020491 Sao Paulo FOLHA DE SAO PAULO
in Portuguese 9 Apr 91 First Section p 8

[By Roberto Lopez]

[Text] Yesterday morning in Sao Paulo, the directors of the Brazilian Association of Defense Materiel Industries (Abimde) [Associacao Brasileira das Industrias de Material de Defesa] began to prepare a document to protest President Fernando Collor de Mello's intention to

approve a mechanism for "the exchange of military information" between Brazil and the United States during his upcoming visit to the United States which is scheduled for June.

The Abimde is afraid that the government might be preparing a new version of the Brazil-U.S. agreement that dominated the thinking of Brazilian military chiefs between 1952 and 1977, frustrating national military industry programs and burdening the Armed Forces—especially the Army and the Navy—with obsolete U.S.-made tanks and ships that were discarded at the end of World War II.

The Abimde is aware that a Brazilian Government delegation will travel to Washington at the beginning of May to define with U.S. authorities the terms of a protocol that will be signed by Collor, but lacks other details. "This government is known for not releasing information; it is very closed," Abimde President Adherbal Olivieri complained in the afternoon.

Collor's trip was the main topic at the association's last meeting in Sao Paulo on 3 April. "We have to strongly protest, even though right now the problem is not so serious, because we are being treated like second-class Brazilians," Reserves Sea-and-War Captain Fernando da Costa, Abimde vice president and executive director of the SFB Informatica [expansion unknown], said during the meeting. SFB is a Rio de Janeiro firm that develops naval systems based on British technology.

Da Costa sounded quite concerned on the telephone: "Any agreement creating a new dependence among Brazilian military will be like shoveling earth on the country's military industry. I am going to tell our associates that they should leave the industry as fast as they can."

In the past the Abimde could count on 65 associated firms. Today less than 50 are up to date with their monthly contributions. The situation is barely a shadow of the crisis that is about to fall on a military industry that employed 80,000 people in the past and which does not employ more than 40,000 today.

Fernando da Costa said that entrepreneurs involved in military production—many of them reserve officers—have tried to contact generals, admirals, and brigadiers to discuss their concerns. "They have told us that the issue is under study, that no one knows exactly what is it all about, and that no formal proposals on the matter have been submitted, but we are ready to go up to the military ministers." Da Costa said that Olivieri requested a meeting with Strategic Affairs Secretary Pedro Paulo Leone Ramos "two or three times" but that a meeting was never scheduled.

Joint Nuclear Committee Holds Fifth Meeting*PY0604145491 Brasilia Radio Nacional da Amazonia Network in Portuguese 1000 GMT 5 Apr 91*

[Text] The standing Brazilian-Argentine Nuclear Policy Committee will hold its fifth meeting in Buenos Aires. Correspondent Gustavo Mariani has filed this report:

[Begin Mariani recording] The Brazilian Foreign Ministry has reported the meeting agenda. Brazil will be represented by Jose Luis Santana, National Nuclear Energy Commission chairman, and Itamaraty Economy Department chief (Celso Morim). Basically, the agenda will include two issues: an evaluation of the first round of talks on mutual safeguards, which were held in Brazil in November 1990, and an evaluation of a bilateral proposal to proscribe nuclear weapons. In September, this proposal will be submitted by both countries to the International Atomic Energy Agency [IAEA] in Vienna, Austria.

Itamaraty has noted that the agreement to be signed with Argentina and the IAEA could eliminate international distrust in connection with Brazil, which is not a member of the nuclear nonproliferation agreement.

Itamaraty added that the safeguard agreement with Argentina is important because it will facilitate the transfer of sensitive technology to the two countries. [end recording]

Export of Nuclear Fuel to Germany Viewed*PY0504142991 Rio de Janeiro O GLOBO in Portuguese 3 Apr 91 p 17*

[By Pablo Motta]

[Text] Brazil and Argentina will form a consortium that will initiate an unheard-of change in the history of advanced strategic technology trade. According to Brazilian Government sources, the consortium has already signed a deal to sell nuclear fuel for use in German power plants. This is the first time that a Third World country, instead of purchasing nuclear technology, will sell it to a First World country.

The German firm Siemens has contracted the services of the consortium because the power plants it administers have been experiencing fuel supply problems since a fire damaged the fuel processing plant in Hanau (Germany). The total volume of nuclear fuel that will be exported and the value of the deal are considered industrial secrets.

The fuel production chain begins in Brazil. Here the uranium is transformed into yellow cake [previous two words in English] at Pocos de Caldas in Minas Gerais. The material is then sent to Argentina, where it is

transformed into purified uranium and where the fuel rods are manufactured. The product is then sent back to Brazil for a final refining at the Fuel Element Factory (FEC) in Resende, Rio de Janeiro.

According to government sources, the product is not enriched uranium, but rather processed uranium fuel rods for use in nuclear power plants, which control the reaction with heavy water. Germany and Argentina use this type of nuclear power plant. Brazilian plants use enriched uranium, and the nuclear reaction is controlled by pressurized common water.

According to the source, another step in the integration of the Argentine and Brazilian atomic programs—in addition to the ongoing process of mutual inspection of nuclear installations—will be the production of enriched uranium for the next refueling of Angra-1, which is scheduled for May or June. This will be the first time that the fuel for Angra-1 will not be provided by a First World country.

In the last refueling of Angra-1, the uranium cake produced in Pocos de Caldas was enriched by German installations and then transformed into fuel in Resende. The fuel rods were produced in Argentina. The Angra-1 nuclear power plant has been operating for 180 days without interruption.

According to experts, the first quality tests carried out on the fuel produced by the consortium yielded excellent results.

Iraq Denies BBI Involvement in Arms Sales*PY0604013091 São Paulo FOLHA DE SAO PAULO in Portuguese 4 Apr 91 First Section p 9*

[Text] Brasilia—Iraqi Ambassador to Brazil Qays Tawfiq al-Mukhtar yesterday told FOLHA that the Brazilian-Iraqi Bank Inc. (BBI) did not finance arms exports from Brazil to Iraq. He said that since 1982, when the BBI was created, there have been practically no Iraqi imports of arms from Brazil.

The Iraqi envoy said that after 1982, instead of importing Brazilian arms, Iraq hired the military consulting services of Brigadier Hugo Piva.

He described as "somewhat absurd" the U.S. Treasury Department decision to include the BBI, the BBI insurance company, and Iraqi Airways on its blacklist. He said this measure was designed to force Saddam Husayn's ouster.

The Bank of Brazil, which owns 50 percent of the BBI shares, has reported that the BBI management has already taken steps to remove the BBI from the U.S. Treasury Department blacklist. The Brazilian Foreign Ministry has also contacted the U.S. Embassy in Brasilia.

Minister Disagrees With Rezek on Atomic Research

PY2303024291 Rio de Janeiro O GLOBO in Portuguese
21 Mar 91 p 7

[Report by Monica Medeiros]

[Text] Brasilia—Navy Minister Admiral Mario Flores has disagreed with Foreign Minister Francisco Rezek's statement. Rezek said that if the United States asked the Brazilian Government to stop conducting nuclear research, Brazil would do so provided that it received something in exchange.

On 20 March Flores sent a personal letter to the Foreign Ministry, criticizing Rezek's attitude.

In his letter that was published by the O ESTADO DE SAO PAULO newspaper, Flores described Rezek's statement as untimely. He said that Rezek showed that he did not understand the matter and that he had little ability to negotiate.

What primarily disappointed Flores was the fact that Rezek's statement jeopardizes the project to build a nuclear propulsion submarine, a project the Navy considers strategic.

In his letter Flores gives a detailed explanation of the importance of mastering that technology and of the disadvantage incurred by making advanced statements on what could occur in negotiations.

Flores also said that he does not think the Navy will discontinue the project and that he never discussed the matter with the Foreign Ministry.

Uranium Enrichment Plant Ready for Operation

PY2303233091 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Mar 91 p 9

[Report by Jose Maria Tomazela]

[Excerpts] Sorocaba—The Navy Ministry's Aramar experimental center, which is located in Ipero, 125 km from Sao Paulo, has built a new uranium enrichment facility. This facility consists of a set of 600 ultracentrifuges which specialists refer to as "minicascade," with the ability to enrich uranium to 20 percent, at a preindustrial level. [passage omitted]

The unit will be dedicated on 31 May. This information has been released by Rear Admiral Othon Luiz Pinheiro da Silva, chairman of the Special Projects Coordinating Board (Copesp), who is in charge of the research center. [passage omitted]

Pinheiro da Silva said: "Our routine work will be with the 5-percent concentration that we have obtained so far." Uranium that has been enriched to 5 percent can be used to produce electric power in reactors like that of Angra dos Reis. The enrichment process increases the

concentration of uranium-235 (radioactive) in a sample of natural uranium-238, which is not radioactive.

The first minicascade at the Almirante Alvaro Alberto uranium enrichment plant, in Aramar, has 48 ultracentrifuges and produces 1.4-percent-enriched uranium. The Navy keeps its production capacity secret. [passage omitted]

According to Pinheiro da Silva, the Federal Government's "financial diet" has affected the development of the nuclear program within the originally established terms. He said the funds allocated this year amount to 25 percent of the expected total. He said: "For the nuclear fuel cycle, we have received the equivalent of \$12 million (Cr 2.8 billion at the black market dollar rate)." [passage omitted]

Azambuja Trip to India Postponed

91WP0082B Sao Paulo GAZETA MERCANTIL
in Portuguese 12 Mar 91 p 6

[Article by Brasilia correspondent Claudio Kuck]

[Text] Ambassador Marcos Azambuja, secretary general of foreign policy, told our newspaper yesterday that the trip he was to make to India at the end of the week was postponed due to the resignation of the prime minister of that country. The objective of the mission was to make contacts in the area of science and technology, "since the Indians hold full sway in the nuclear sector and, principally, in the space sector, which is of considerable interest to us."

Azambuja said that India is important in this area for Brazil inasmuch as India, together with China, is one of the few remaining centers for sensitive technology among developing countries. The visit was transpired at the request of the Indian Government itself and is to serve as a follow up to the trip which the ambassador made recently to Washington together with Jose Goldemberg, secretary of science and technology, and Paulo Leone Ramos, special secretary of foreign affairs, who were also scheduled to accompany him to New Delhi.

Rezek Foresees Safeguards Agreement This Year

91WP0082A Sao Paulo GAZETA MERCANTIL
in Portuguese 8 Mar 91 p 21

[Article by Brasilia correspondent Claudio Kuck]

[Text] Recent negotiations among Brazil, Argentina, and the International Atomic Energy Agency (IAEA) turned out satisfactorily and Chancellor Francisco Rezek told our newspaper yesterday that still this year "presidents Fernando Collor and Carlos Menem are scheduled to sign a formal pledge with the IAEA on safeguards in Brasilia, Buenos Aires, or even in Vienna."

This, as well as the ratification of the Tlatelolco Treaty by Argentina, is to be one of the subjects discussed with Argentine Chancellor Guido di Tella who arrived last night in Brasilia. Rezek said that positions of concern were expressed in Vienna regarding the IAEA and the nuclear question, considering the preservation of the "industrial secret." "And the agency did not consider this superfluous," he said.

Industrial Secret

In Rezek's opinion, this preservation of the industrial secret has a calming effect on the productive areas of the sector which would not like to expose their techniques "to the eyes of any possible interested parties." And he maintained that this is a concern of all democracies, even the most peaceful ones. He added that in view of the recent negotiations, the question of Brazil and Argentina not signing the Nuclear Nonproliferation Treaty "is no longer an obstacle for the IAEA."

This is because Brazil and Argentina are bound by the Tlatelolco Treaty not to construct warlike nuclear artifacts in Latin America. The fact that France (which has colonies on the continent) and Cuba did not sign the treaty complicates the issue, but Rezek said that "their inclination in this respect is good." He is even planning a trip to Havana in the near future where this will be one of the subjects discussed.

Rezek also deplored the fact that, due the lack of funds and personnel, negotiations with Argentina are not further advanced with regard to a treaty on the prevention and use of chemical and biological weapons.

Sensitive Technology

As for Itamaraty, negotiations with Argentina and the IAEA should in the future facilitate the transfer of sensitive technology to Brazil. Rezek acknowledged that, in the recent visit to Washington of Ambassador Marcos de Azambuja, secretary general of foreign policy, and Jose Goldemberg, secretary of science and technology, "the general standard of safeguard requirements for the export of high technology was raised in comparison with June of last year, but that has nothing to do with Brazil; rather, it concerned the Gulf crisis with the implication of other countries."

The conditions now presented by the United States to the products of interest to Brazil "were expected," said Rezek. Those conditions allude to the destination, circumstances of their utilization, and eventually guarantees that they will not be overlooked, "which represents no sacrifice for us since our game is open and we do not want to transfer anything on the sly to third countries, our interest being to apply the technology of our own development." He is sure that the U.S. Government is aware of this. In Rezek's opinion, the request for safeguards makes sense, since the U.S. Administration is obliged to give satisfaction to its society, Congress, and press, "all of whom want safeguards."

INDIA

Particle Detector Under Construction

91WD0641 Calcutta *THE TELEGRAPH* in English
2 Mar 91 p 2

[Text] Calcutta, 1 March—The Variable Energy Cyclotron Centre (VECC) at Salt Lake has almost finished fabrication of the "photon multiplicity detector" which will examine the existence of the state of matter believed to have existed in the universe one million of a second after the Big Bang.

According to Dr. Bikash Sinha, director, VECC, the detector will be ready by March when it will be shipped to the CERN laboratory in Geneva where it will be put to use to detect that particular state of matter known as quark gluon plasma (QGP). The actual experiment, he added, will begin on 1 October.

Addressing a press conference today, Dr. Sinha praised the initiative of the VECC scientists who put in a lot of effort to complete the fabrication within the deadline set by experimenters at CERN. The experience gained in building this detector will stand them on good stead while making another by 1993, he added.

Dr. Hans Gutbrod, spokesperson of the experimenting team at CERN, was also present at the press conference. He explained that the detector has been specially designed to ascertain the creation of particles in such reactions as predicted by the VECC scientists some years back.

The Rs 15 lakh (excluding the manpower cost)-detector will be used by a 85-member team of experimenters from the U.S., Germany, the Soviet Union, Switzerland, Holland and India, according to Dr. Gutbrod. The 24 physicists, who will form the Indian contingent at CERN, Dr. Sinha said, will be from the universities of Jammu, Chandigarh and Jaipur and those at the VECC.

Dr. Sinha claimed that the VECC has achieved a number of successes in various fields besides providing particle physicists in eastern India with a solid R&D base. His centre has succeeded in convincing the Union government of the need to install a Linear Accelerator Facility at the Regional Radiation Medicine Centre, Cancer Centre and Welfare Home, Thakurpukur. The accelerator will provide an advanced technique for cancer treatment in the city.

Delhi Plans 'Large' Zirconium, Titanium Complex

91WD0642 Madras *THE HINDU* in English
11 Mar 91 p 10

[Text] Madras, 10 March—The Department of Atomic Energy, Government of India, is planning to set up a large zirconium and titanium metal complex at Palayakayal village (near Tuticorin), utilising the zircon sand deposit in this area, at an estimated cost of Rs. 180 crores. It will go on stream in the next three to four years.

The State Government will participate in this project through the Tamil Nadu Industrial Development Corporation and has given approval in principle to the TIDCO to invest up to 10 percent of the equity of the project.

PSLV's Rocket 'Successfully' Tested

BK2403044291 Delhi *Domestic Service* in English
0240 GMT 24 Mar 91

[Text] The Indian space research organization reached another milestone in the Polar Satellite Launch Vehicle [PSLV] program yesterday. It successfully completed the ground testing of the powerful booster rocket motor and its control system at Sriharikota in Andhra Pradesh. This is the second test of the booster solid rocket motor. It has established the design and performance of the rocket motor and its components. The 2.8 meter diameter rocket motor is currently the third largest of its kind in the world. It has been designed by Vikram Tara Bhai Space Center at Trivandrum.

ISRAEL

Test Flight of Arrow Missile Successful

Fired Into the Mediterranean

TA2503173491 Jerusalem *Domestic Service* in Hebrew
1650 GMT 25 Mar 91

[Text] Another test of the first phase of the Arrow antiballistic missile was conducted today. The missile was successfully fired into the Mediterranean Sea from a ship. Our correspondent Karmela Menashe has the details:

The Israeli Arrow missile project, designed against tactical ballistic missiles, successfully completed a test flight of an interceptor missile in an Israeli test field. This is the text of the press release given to us by Dani Nave, the defense minister's adviser. The text had been jointly agreed upon by the Americans and the Israelis, and its timing had been coordinated with the Americans.

This was the Arrow's second test flight, which was designed to verify design and integration of the missile's components. The test flight is part of a research and development plan supporting the Israeli Government's decision to prepare a defense against tactical ballistic missiles in the region.

This time, the test was conducted from an Israeli Navy ship, from east to west in the middle of the sea, away from any populated area so as to prevent any problems. The test was observed by American representatives, Israel Aircraft Industries [IAI] top executives, and Israeli Air Force officers.

As previously mentioned, the missile was fired from east to west into the Mediterranean Sea. According to plans, the flight lasted for one minute, and then the missile was destroyed. The test was designed to test the ignition,

guidance, and control systems. IAI engineers are now checking the missile's performance.

The previous test was conducted on 9 August 1990, a few days after the Iraqi invasion of Kuwait. According to foreign publications, the missile had been destroyed within a short period of time—about five seconds—and the launch had not been complete. This time, all measures were taken to do away with the malfunctions of the first launch. The maiden launch in August signaled the end of the first development phase. The budget for this phase had been \$160 million, 80 percent invested by the Americans and 20 percent by Israel. The Arrow had not been not launched at any target in the air, but only to prove the technology.

The development phases will continue until 1995. The extent of the Israeli investment to complete the project is not yet clear. The budget the defense establishment will have to allocate is up to the U.S. Administration's decision about its share in financing the Arrow project. In the meantime, Defense Minister Moshe Arens has instructed the IDF [Israel Defense Forces] to include the Arrow project in its multiannual work program. Minister Arens regards the Arrow project as a key component of his strategic perception. In his opinion, the issue of defense against ballistic missiles must be the most important goal of the defense establishment. The latest developments in the Gulf and the missiles fired at Israel only enhance this goal and illustrate its importance.

[Jerusalem Domestic Service in English at 1700 GMT on 25 March carries a report by defense reporter Alan Ben-Ami, who adds that "two more tests are to be carried out later this year, including one in which the Arrow will seek to intercept a dummy ballistic missile."]

Malfunction in Second Stage

TA2503181191 *Jerusalem Israel Television Network in Hebrew* 1800 GMT 25 Mar 91

[Excerpt] The second launch of the Arrow antiballistic missile was conducted this afternoon in the middle of the sea. Our military affairs correspondent reports that the missile completed its trajectory as planned for one minute, but notes that the test was only partially successful. A malfunction in the relay of data from the missile was detected during the second stage of the launch. Israel Aircraft Industries engineers are now checking the reasons for the malfunction. There is as yet no decision on whether to proceed with the project as planned, or to postpone the development plan. [passage omitted]

Arens: Two More Tests Upcoming

TA2603112991 *Jerusalem Domestic Service in Hebrew* 1100 GMT 26 Mar 91

[Text] Defense Minister Moshe Arens said there is a good chance that four Patriot batteries will remain in Israel. Our correspondent Yo'el Nir reports that Mr. Arens told the Knesset Foreign Affairs and Defense

Committee that two U.S. batteries are already deployed in Israel, and a third will be funded by Germany. The fourth battery will be provided by the United States as part of the extraordinary military aid it promised in the wake of the Gulf war.

Referring to the Arrow missile, the defense minister said that another two tests are expected in the first stage, and after that funding for the second stage will be agreed on with the U.S. Administration. The United States is currently funding 80 percent of the Arrow's development budget.

PAKISTAN

U.S. Opposition to Pakistani Nuclear Plans Viewed

LD2703182991 *Moscow World Service in English* 0610 GMT 27 Mar 91

[Commentary by Aleksandr Korolev]

[Text] The man in charge of Pakistan's Atomic Energy Commission, Munir Ahmad Khan, in a newspaper interview has said the United States may soften its position on Islamabad's nuclear program now that the Gulf war is over. Mr. Khan's wording is an indication of Islamabad's hope for an early resumption of American aid suspended last year. But to what extent can this hope be justified? Commentary is by Aleksandr Korolev:

Official statements of this kind have been made for quite some time. The question is whether they indicate an understandable desire for restoring a special relationship with the United States and a \$600 million worth of annual aid that went with it, or a realistic judgement of the postwar situation in the Gulf.

On balance, it seems the desire outweighs all other considerations. Last year's aid withdrawal by the U.S. Congress was caused by suspicions that Islamabad was conducting concealed research to develop its own nuclear weapons. The two main factors which led to the congressional ban are still there. On the one hand, fears are still strong in Congress about the proliferation of nuclear weapons and even the euphoria of the victory of the Gulf war has failed to relieve them. On the contrary, an amassment of arms such as Iraq's can develop into a regional disaster and worse still if President Saddam Husayn has nuclear weapons.

But, on the other hand, Islamabad's own position can hardly help bring a change of heart by U.S. Congress. Apart from verbal reassurances, Pakistan's new government did little to dispel doubts about its nuclear program. Doubts will remain while the country's prime minister, Mr. Nawab Sharif, continues to [word indistinct] access to its nuclear installations by an international team of independent inspectors. It threatened meanwhile that a nuclear plant in Kahut is capable of

producing 33 pounds of enriched uranium a year, good enough to make two nuclear bombs.

One other reason why doubts persist is that Islamabad is unwilling to join the Nonproliferation Treaty, even in exchange for U.S. aid. These doubts mount each time exposures are made of renewed Pakistani attempts to buy on the sly any piece of western equipment which can be used to develop nuclear weapons. The LOS ANGELES TIMES said recently that some U.S. officials were now admitting in private they turned a blind eye on Pakistan's nuclear research in the 1980's because it was used for U.S. arms shipments to the Afghan mujahidin.

Things have now changed and U.S. Congressmen are less inclined to forego the aid embargo they imposed on themselves until Mr. Bush produces enough evidence saying that Pakistan is not engaged in developing its own nuclear potential.

U.S. Claimed To Oppose Efforts of Muslim Countries

91AS0600X Karachi JANG in Urdu 19 Jan 91 p 3

[Editorial: "Danger of Gulf War Spreading"]

[Text] A very dangerous and destructive war has begun with the United States and its allies' attack on Iraq. The U.S. and allied airplanes have started to make Iraq's military installations and urban population their targets. The allied forces have evoked the memory of Hiroshima by dropping thousands of tons of bombs. The United States claims that it has destroyed Iraq's air force and the crucial military installations while Iraq claims that it has downed 74 U.S. planes and that its air force and important military installations are totally safe. We have also learned of the destruction of two hospitals and the deaths of 500 people in Iraq as a result of U.S. bombings. The most disturbing news is that the U.S. attacks have also damaged holy places like Hazrat Imam Moosa Kazim and Ghaush Alazam Abdul Qadir Jeelani's tombs in Baghdad. The United States has also attacked Karbala and Najaf Ashrif; however, the attackers were chased away by Iraqi airplanes according to our sources. The sphere of the war in the Gulf is spreading every minute. Iraq has also attacked Saudi Arabia and Bahrain and there is fear of Israel joining the war. Israel has threatened Jordan that it would not stay quiet if Jordan allowed Iraqi airplanes to use its air space for attacking Israel. The most deplorable side of this war is that the United States and its allies have mostly targeted Iraqi civilian population in their attacks and have bombed hospitals and holy Islamic places thus ignoring Geneva Convention principles. This has angered the Muslims in the whole world. President Bush is telling us again and again that the purpose of this war is to destroy Iraq's nuclear installations. It means that the United States does not want any Islamic country to become a nuclear power. No doubt, the whole thing started with Iraq's attack on Kuwait. Had the United States and its allies wanted to keep the sphere of war limited, they would

have tried just to expel Iraq from Kuwait. The war would not have spread if they had attacked only Kuwait. Destruction from war could also have been reduced if the goals were also limited. Suggestion by Colonel al-Qadhafi, the Libyan president, that the attack should have been limited to Kuwait and the war should have been ended after Kuwait was liberated, should be given attention. However, direct air attacks on Baghdad and other cities in Iraq as well as on military installations, forced Iraq to attack Saudi Arabia and Bahrain. There is a fear that this war might spread from this region to the rest of the world. This could end the human race. Gorbachev, the Soviet president, has appealed to Saddam Husayn once more telling him that the war would end if he would leave Kuwait. We pray that the opposing countries use common sense, give up their stubbornness, and save the world from destruction by limiting the sphere of the war. The details of the results of two days of war indicate that the countries affected by this war will be turned into rubble if the war continues. If it comes to using nuclear weapons, then the human race and human civilization that took centuries to develop would be annihilated. As a scientist once said, the fourth world war would be fought in the Stone Age.

Nuclear Option, Consequences Viewed

Introduction

91WP0084A Lahore VIEWPOINT in English
7 Mar 91 pp 13-16

[Article by Zafaryab Ahmed: "The Nuclear Option: A Debate"]

[Text] Electricity in huge quantities and at low cost, rapid economic development, creation of a strong industrial base, building a formidable defence capability, including the fabrication of a bomb—these are just a few of the benefits cited in going nuclear. In a resource-starved country like Pakistan, who wouldn't be awed by the mystique of nuclear technology? This at least is the dream package being outlined by the nuclear people, and to achieve the dream they find it necessary to dip freely into the exchequer.

But the insurmountable hazards involved in handling nuclear technology never get mentioned. While in Pakistan, like other developing countries, a not uncommon brand of nationalism is being fostered around the attainment of a nuclear capability, people in the West are now more and more worried by the hazards of nuclear technology. Popular repulsion against nuclear technology has increased since the awareness that the line between a peaceful energy programme and a weapons programme is precariously thin. Further, radiation leaks, breakdowns, design flaws, material problems, maintenance of nuclear plants—all these constitute the main concern of pacifist scientists and conscious citizens.

In countries like Pakistan, where there are no standards of occupational health and safety and human life is easily dispensable, the risk of glossing over radiation is high.

According to estimates, 4,000 small and big accidents have occurred around the world in nuclear plants or reactors. The nuclear establishment's first reaction to an accident, or an incident as they call it, is to try to cover it up. One German report says that in the 70s there was one nuclear incident every three days in commercial nuclear power plants, but official sources admitted to only 14 accidents. In Britain it was only when challenged in court in connection with the Windscale project (now Sellafield) that British Nuclear Fuels Limited confessed to 177 incidents having occurred between 1950 and 1977. It had earlier accounted for only 28 accidents.

Today, we live in a world stock-piled by nuclear arsenals. According to the Stockholm International Peace Research Institute (SIPRI), the total quantum of all the bombs used in World War II was just 10 million tons of TNT, but the present stockpile of 50,000 nuclear warheads and about 17,000 under production, is equivalent to 16,000 tonnes of TNT. This constitutes an explosive force equal to 3.5 tonnes of TNT for every man, woman and child and amounts to a capacity that could destroy the world 12 times over. So in the event of a full-scale nuclear war, there will be no victor or vanquished. It will certainly bring the end of human civilisation. The deadly fallout will not discriminate between Christians and non-believers, between Hindus and Muslims, between India and Pakistan, or the rich and poor.

To go nuclear does not simply mean processing nuclear weapons and devising a launching system. It means acquiring an extremely complex back-up infrastructure. A nuclear force would have to be created, with specially trained scientific manpower, and an air force with a complete electronically-operated delivery system, missiles and communications.

Requirements

It requires specialised services for uranium mining and extraction, fuel fabrication, uranium enrichment, heavy-water manufacture, reactor design construction and operation, spent fuel reprocessing, radioactive waste management and disposal, plutonium fuel fabrication, recycling of plutonium, and so on. The cost of each such operation runs into millions of dollars. All these activities are auto-destructive.

Since the atom was split in 1938 and plutonium was separated and identified in 1941, research has focussed on its militaristic use. Despite advice to the contrary towards the end of World War II, President Harry Truman decided to explode the atomic bomb, because it assured the United States "of the possibility of being in a position to dictate its own terms at the end of the war..." In August 1945, two bombs were dropped by the United States on Japan. These killed over 3,40,000 [as published] people.

Near the centre of the explosion, people were instantaneously vapourised by the searing heat, leaving only their outlines scorched into the stonework of walls and roads. Thousands more were killed by being blown to bits, more commonly being hurled against solid objects, crushed beneath falling buildings or lacerated by the shrapnel of flying glass. Others were simply cremated into charred corpses or hideously burned with great patches of skin stripped from their bodies.

This devastation of Hiroshima and Nagasaki, instead of forcing would leaders [as published] to reject the atomic technology race, led to an arms race. Almost for a decade following World War II, nuclear research was subordinated to purely military objectives. The post-war reconstruction, under the U.S. leadership, had rearmament, supremacy of the dollar, the capture of markets and other related objectives as its keynotes. The United States wanted domination of the world and in 1946 denied to Britain and France (its collaborators in the first American nuclear project) any further access to nuclear data. Britain immediately started its own nuclear weapons programme and in six years carried out a successful nuclear explosion off the coast of western Australia. France also embarked on a nuclear programme, although it was not initially aimed at producing a bomb.

The Soviet Union too had started work on nuclear technology before the end of the war. In the wake of growing tensions between the Soviet Government and the Western allies, and the consequent diplomatic chill after 1945 and the nuclear pursuits of the United States, the Soviet Union also speeded up its nuclear activities.

In the early 50s, the United States administration was faced with its first post-war challenges: it couldn't prevent what it didn't want to happen. Some European countries and the Soviet Union had the atomic bomb. There was a possibility of independent nuclear programmes being launched in Western Europe and elsewhere. In response to these external challenges and internal pressures, the U.S. Government did not abandon its nuclear programme, although the Acheson-Lilienthal report of 1946 had warned against the dangers of nuclear technology. In 1952, the American Secretary of State had set up a panel of consultants on disarmament which suggested that the Government must come clean with the public and reveal the full dilemma created by international nuclear weapons. President Eisenhower didn't want to scare his people. He wanted to show, impossibly, the bright side. Addressing the UN General Assembly on December 8, 1953, he announced an Atoms for Peace programme.

The announcement was followed by the U.S. Atomic Energy Act, 1954, and substantial data was declassified. Research and training facilities were made available; over a hundred research reactors were sold abroad—Pakistan also got one—and over 4,000 scientists were trained in the United States. By this, the United States hoped to control nuclear power development and also

check nuclear proliferation and maintain a monopoly over the supply of enriched uranium.

The Fifties

By the beginning of the second half of the 50s, a large number of countries, including some in the Third World, had government-financed nuclear organisations. The first UN Conference on the Peaceful Uses of Atomic Energy was held in Geneva in 1955. This, beside lowering the barriers of secrecy between nuclear people, gave birth to a new kind of ethics and morality. A different kind of nuclear bureaucracy took shape. It created its own rules diametrically different from those of other sciences. The elite started receiving preferential treatment and were accorded a status above their colleagues in other, less exotic sciences. They went on a public relationing spree, assuring everyone of a lucrative future with nuclear power and technology. The different national nuclear organisations, even from hostile countries, had an interest in encouraging each other, so that each might ask its government for more money by pointing to the progress being made in the field by the other countries.

A key, though self-contradictory feature of Atoms for Peace was that it did not impose any restrictions on the United States. It only expected the client States not to divert their facility towards military ends. The activities of these countries were to be monitored through an international organisation. In 1957 the International Atomic Energy Association (IAEA) was formally instituted to encourage civil nuclear programmes while discouraging governments from pursuing military nuclear programmes. The dual function of the Agency was formalised in the concept of "safeguards." In return for the provision of nuclear facility, every country was to accept safeguards based on a bilateral agreement between the buyer and the seller. In 1962, to make the Agency responsible for the implementation of safeguards, the IAEA was made a third party to all sale agreements. The safeguards agreements specify means by which the supervising authority can establish that the activity concerned is being carried out within the specified limits. But the safeguards could at best serve to detect irregularities at a nuclear power plant.

The situation had started taking a course different from what the United States had foreseen. It had hoped that the generous outward flow of American capital and technological assistance would create a stable market for its goods and consequently the dollar would emerge as the major post-war currency. The United States even welcomed the launching of the Euroatom system in the late 50s and granted it special dispensation from the usual restrictions on the use of nuclear fuel. This helped in the beginning, but gradually resistance developed against American nuclear intervention in West Europe.

By the late 60s, the international situation had changed drastically. France among European countries had set off its nuclear explosion in 1960 and China in 1964. Nuclear

technology had become established in almost all the advanced capitalist countries; Japan and Western Europe were emerging as economic if not nuclear rivals. By the end of the decade, American hegemony was on the decline. The economic, political and social strains of the Vietnam War manifested themselves in the devaluation of the dollar by the Nixon administration in 1971.

Earlier, in 1968, after lengthy deliberations between the sponsor governments, the UN General Assembly agreed to open for signatures a Non-proliferation Treaty. The document was drawn up and co-sponsored by the USA, the USSR and Britain. Signed by 40 other States, it came into force on May 5, 1970.

Article 1 of the NPT prohibits nuclear weapon States from transferring nuclear weapons to a non-weapon State or to assist a non-weapon State from acquiring nuclear weapons. Article 2 says that a non-weapon State will not accept or otherwise acquire nuclear weapons. Article 3 says that each non-weapon State will accept safeguards on its nuclear installations, and no State will provide nuclear material or technology to any other State unless that State accepts safeguards. Article IV of the treaty provides for sharing of know-how and technology for peaceful purposes between the NPT signatories. And Article VI calls for evolving effective measures for the cessation of the arms race at an early date.

Nuclear Disarmament

By this time the campaign for nuclear disarmament had strengthened in the West and awareness about hazards to the environment from nuclear pollutants and the issue of reactor safety had crystallised into the green movement. The first half of the 70s was a boom period for the industry. An average of 35 reactors were being ordered every year. The main orders were going to American corporations, but West Germany, France and Canada were also in the market. A market was created in the Third World countries, partly by the advances made by these countries on the plants installed with United States help, and partly because of insecurity generated by mutual suspicions. Moreover, the dynamics of corporate profitability tempted the West Europe competitors to launch a nuclear export drive in these countries.

A number of countries started trying to sell extremely complicated and capital intensive technology to countries in dire need of basic industries and power grids. American corporations offered a cut price supply of uranium. West Europe offered to sell along with power reactors certain "sensitive" nuclear facilities, such as enrichment and reprocessing works and fast-breeder reactors. The United States employing non-proliferation rhetoric, imposed strict conditions on uranium supply and in 1977 imposed a unilateral ban on the supply of uranium enrichment technology.

The situation today, however, is that besides the recognised nuclear Powers, several other countries either possess nuclear weapons or are close to doing so. India exploded a device in 1974 on the basis of its own

technology and facilities bought from Western countries like Canada, France, Germany and even the USA. Pakistan too is said to be far advanced with knowhow obtained from the West. The United States has serious objections to our programme; in Pakistan this is seen as the work of the Indo-Zionist lobby influencing the U.S. Senate. Islamabad maintains that after the Pokharan explosion by India, it cannot afford to give up the nuclear option.

Pakistan's nuclear establishment is modelled on the USAEC. The Pakistan Atomic Energy Commission was founded in 1955, and became functional with the installation of 5-MW research reactor in 1965. It has only recently acquired a small 27 KW reactor from China. In May, 1965, the PAEC had signed a turnkey contract with a Canadian company to design, construct and install a 137-MW candu type power reactor near Karachi which became critical on August 1, 1971, and was formally inaugurated on November 28, 1972.

The Americans have started expressing doubts about the Pakistani nuclear programme. According to a report to the U.S. Senate Committee on Foreign Relations, the then head of government, Mr Zulfikar Ali Bhutto, had asked Pakistani scientists in 1971 to develop a bomb. With the Indian nuclear explosion and the beginning of negotiations the same year between France and Pakistan for a reprocessing plant at Chashma, the American attitude hardened. Henry Kissinger told Mr Bhutto that work at Chashma would trigger an aid cut off. The Canadians under American pressure or because of the Indian explosion stopped fuel and heavywater supply for KANUPP. France also backed out from the Chashma agreement. The withdrawal of supplies and cancellation were seen as constituting a violation of legitimate international agreements. This is where it is said that the Government of Pakistan was left with no choice but to master enrichment technology.

The dilemma for Pakistan is that the only country with which we are tied in a defence pact and of which we are termed as a client State is the strongest opponent of Pakistan going nuclear. Some political adventurers, unaware and unconcerned about nuclear hazards, believe that nuclear energy is a panacea for all our problems and they have made the nuclear issue part of their political programme. Indeed, if there is a consensus among political parties on anything in Pakistan it is on maintaining the nuclear programme. The bosses of the Pakistani nuclear establishment keep fuelling the situation by dropping hints about the country's nuclear potential which are meant to convey the impression that we have the bomb. When asked about the hazards, they either gloss over the question or give the impression that our installations have no such problems, although no nuclear reactor is one-hundred per cent safe.

Not Peculiar

The refusal to accept the hazards involved is not peculiar to the Pakistani authorities. It is a policy with nuclear

establishment all over the world to suppress information not only about their own facilities but also of their enemies. They feel threatened by any such information being made public "To claim that Pakistan's nuclear system is safe or that there is no chance of a China Syndrome (noticed during the Nine Mile Island incident in the United States) [as published] in the CANDU system is misleading. Suppose the installation is hit by an earthquake or an enemy missile. In such an event it will not explode like a bomb, but it can rupture. If the containment structure is damaged, the release of high radioactive liquid material and solids can't be avoided."

"Any scientist who claims that nuclear power is the safest makes a metaphysical statement. Uranium 235, for example, produces several highly radioactive elements when it goes through the energy producing fission process. Besides, extra neutrons, when captured by non-fissile uranium 238, generate heavy radioisotopes such as plutonium which remain hazardous for thousands of years. These substances produce intense beams of radiation and even if any trace escapes into the environment, it is sufficient to contaminate water and enter our food chain."

An Indian scientist commenting on accidents at his country's plants says: "The totality of factors cannot be perceived in a simulation of an accident. Even though CANDU has the best safety record, it can't be said that it is totally free of defects. If the pressure tubes are damaged, radioactivity can hit the heavywater moderator and cause the meltdown of the fuel bundles, which can cause a chain reaction, melting the core structure and in the process generate extremely high temperatures, smoke and dangerous gases. It is difficult to predict how long a containment chamber can withstand the pressure of 5,000 degrees of the melting, inner-fuel ore. No scientist can guarantee absolute safety in case of such an uncontrollable condition inside a nuclear reactor."

Decision-making

The decision to go nuclear or not rests with those who decide our policy. For many years, they have been listening to what advocates of nuclear energy have been saying. What is the Establishment view about building a bomb is not known: it is a hush-hush subject. But it is an established fact now that nuclear energy is not the safest or the cheapest source of energy. Even if it has the potential to generate electricity in abundance, despite the huge amounts being spent on its development, it does not meet more than 15 per cent of the world's total electricity supply. The operational life of a reactor is between 25 and 35 years. The construction period is long, and the initial investment phenomenal. The cost of decommissioning is expected to more than double the cost of installation. Waste disposal pits need to be monitored for thousands of years. The amount of funds required for the management of a "burial ground" will be substantial.

Owing to all these hazards and costs, one needs to ask the question: can't we do without nuclear energy? In the West, perceptions are changing. More than 600 orders for atomic reactors have been either cancelled or deferred. Many States in the USA have banned the commissioning of already constructed atomic power plants. In Sweden, where the nuclear power industry has been most successful, a referendum was held in 1980 which resulted in the decision to phase out nuclear power by the year 2010. In a referendum in Austria, the opponents of nuclear power were successful and a completed power reactor (Zwentendorf) was not brought on line. In Spain, five reactors on which construction has started have been withdrawn from the development programme.

Can a poor country like Pakistan afford such luxury? It is already spending a substantial amount of its meagre resources on development of nuclear technology. It would be appropriate to pause and think rationally about what the nuclear people have been telling us.

The nuclear option should be publicly and unemotionally debated. To stimulate such a debate, VIEWPOINT in this issue interviews Mr Munir Ahmad Khan, Chairman of the Pakistan Atomic Energy Commission, as well as a physicist, a general and a young economist-cum-politician. There is also a comment by nuclear physicist Dr Pervez Hoodbhoy of the Quaid-i-Azam University, Islamabad, this year's winner of the Faiz Award.

AEC Chairman Notes 'Too Much Talk'

91WP0084B Lahore VIEWPOINT in English 7 Mar 91
pp 16-18

[Interview with Munir Ahmed Khan, Chairman of Pakistan Atomic Energy Commission: "Too Much Talk About the Bomb"; date and place not given]

[Text] Mr Munir Ahmed Khan is Chairman of the Pakistan Atomic Energy Commission. He feels that the "irresponsible articulation of our nuclear policy has done irreparable damage to our credibility."

In an interview in Islamabad, he said: "Too much talk about the bomb has won us many enemies abroad."

The interview was arranged during one of Mr Munir Ahmad Khan's visits to Lahore but was held in his spacious office at the PAEC's headquarters in Islamabad. One of the main areas of investigation was the standards of health and safety at our nuclear reactors. Mr Munir Ahmad Khan said:

Two years ago, there was a leakage of heavy water in KANUPP. Thirty-six tons of heavy water collected in the chamber underneath the reactor. This water was immediately recovered and purified and put back into the reactor. Our losses in terms of evaporation and purification were of the order of three to four tons. No radioactivity was released into the environment and

nobody was over-exposed. It was a minor incident and did not cause any radiation injury or related damages.

[VIEWPOINT] What is the possibility of the reactor developing another leak?

[Munir Ahmed Khan] We have taken additional measures. The leak occurred because of a neoprene plastic gasket, which was installed many many years ago and it had contradicted. We have replaced that gasket. No problem anymore.

[VIEWPOINT] What is the life of the KANUPP reactor?

[Khan] The normal life of a KANUPP-type reactor is 35 years. But if we continue to make improvements and change certain parts of the reactor, its life can be prolonged up to 50 years.

[VIEWPOINT] There will be no need to dismantle it in the near future?

[Khan] No need to dismantle it now. It is only 18 years old at the moment, only half of its life is over.

[VIEWPOINT] One reads of failure of nuclear fuel bundles at various plants...

[Khan] KANUPP is so designed that if even 1 per cent of the fuel bundles fail, the built-in safety is adequate to take care of its releases. We are very lucky we have not had a single fuel failure at KANUPP. We have loaded thousands of Pakistani-made bundles. We had assumed that a few tons would fail and we were prepared to withdraw them before they could cause a serious situation, but so far not a single Pakistani bundle has failed.

[VIEWPOINT] Do we make our own heavy water?

[Khan] We purify our own heavy water. We have an upgrading plant for diluted heavy water. The water that is "leaked" in the process absorbs some moisture. It is no longer pure heavy water. After taking in moisture, it becomes downgraded. We have made our own upgrading plant.

[VIEWPOINT] How much does it cost?

[Khan] One kilogram of heavy water costs \$250.

[VIEWPOINT] After so many years of the Atomic Energy Commission, you have only one reactor. Isn't this a rather poor performance?

[Khan] We wanted to build more power stations. In 1976—March 22—the Government of Pakistan approved the construction of three new power plants. We were about to invite bids in March 1977. This was pre-empted by the great political change and it took us a couple of years to recover from that. After 1979, the United States stopped all aid to Pakistan. The international climate also changed. Then certain people started talking about environment and the bomb. The U.S. Government imposed a complete embargo. The Government of Pakistan decided that it must retain the nuclear

option. If you retain this nuclear option, you can't expect other countries who have signed the NPT and want to assist only the NPT signatories to give you the nuclear reactor. The constraint is political. The decision to have the nuclear option we have made after due consideration. This time we have paid for not compromising on our nuclear policy. Now PAEC is not the body that makes political policy of the country.

[VIEWPOINT] What do you think of these public statements about our nuclear plant?

[Khan] I think one of the greatest handicaps that we have in our country is the irresponsible articulation of our nuclear policy. It has done irreparable damage to our credibility. Too much talk about the bomb has won us many enemies abroad. They are using our utterances to dissuade governments and build up international public opinion against Pakistan. That is why now very few countries agree to co-operate with us. It was with great difficulty that we convinced France to help us. If we continue talking about the bomb, it will jeopardise our relations with other countries.

[VIEWPOINT] What is the status of the two new reactors that the previous government negotiated?

[Khan] I think that the Gulf War and the Iraqi occupation of Kuwait have given such a big jolt to international relations that nobody has had the time to think about it. Once this issue is settled, we will resume negotiation.

[VIEWPOINT] This means that our previous timetable has been upset.

[Khan] Yes. It has been upset. The previous timetable was that by 1991, we should sign the contract. Installation was to be completed within six years at a cost of about \$1,400 million. The cost may not inflate; it may go down because of the consequent economic depression. Anyhow, the initial cost eventually balances out. It would be profitable the next time.

[VIEWPOINT] The nuclear option which you said that the Government wants to maintain. What is our potential?

[Khan] This means that we do not want to bind ourselves. Retaining the option does not mean that we are making the bomb. It is that we would like India to give up the option and we will follow. If the Indians sign the Non-proliferation Treaty, we will have no reservations about signing it.

[VIEWPOINT] The argument generally put forward in favour of nuclear energy is that it will help Pakistan's industrial development. There are other conditions to be met beside installation of industrial units. There are questions related to industrial development that bother one—what industry will we install, the availability of markets, the quality of our goods, competition with other established countries, the level of technical know-how in Pakistan.

[Khan] Atomic energy can help in the development process in two ways. One is that we can provide cheaper electricity. If we succeed in that we can overcome the energy shortages, and industrialise. Secondly, we can apply nuclear techniques in agriculture and medicine. One of the most important contributions that we have made is in the field of agriculture. We are using atomic radiation to develop new varieties of cash crops like cotton, wheat and rice. Our cotton exports have multiplied after the introduction of new varieties like NIAB-78 and Pakistan has become the third largest cotton-exporting country in the world.

[VIEWPOINT] Is this process co-ordinated with other aspects of development?

[Khan] When we develop a new variety, we co-ordinate with provincial and national authorities. We are part of the overall research for developing new varieties of cotton, wheat, etc. The difference is that others are using conventional techniques. We are using nuclear techniques.

[VIEWPOINT] But this push towards cash crops affects the entire cropping pattern and the rural lifestyle. There can be a rush for cash crops, upsetting the delicate rural balance.

[Khan] That does not happen. This fits into a pattern. Cotton is sown in this country, it has its cropping season, its harvesting. We just give them a new variety with better seeds and early maturing. The Seed Corporation sells this seed. The balance between the cash and others has to [be] maintained by the provincial agricultural authorities. We have given them a Mung bean variety which matures in 70 days instead of 90. Isn't it a big push?

[VIEWPOINT] Have you considered alternate sources of energy?

[Khan] For us nuclear energy is the alternative source. We are concentrating on that.

[VIEWPOINT] How about solar energy? We have big deserts. The Americans have set up a solar energy plant in California.

[Khan] At one time, about 18 years ago, we were working on solar energy. The government of the day decided to leave their solar energy project with the PCSIR laboratories. I think that was a mistake. We could have worked on solar energy much better. In Pakistan, we have two different ministries—Oil, Gas and Petroleum is one, Water and Power is the other. Solar energy is with the PCSIR. Atomic energy is with us. We have suggested to the Government to have one integrated energy organisation. There is also a need for a well coordinated, well-integrated energy policy. All our present plans are short-term. Nobody is thinking about our energy needs, say, twenty years from now. They all say: "Han kuch laga doo yar. Gas turbine ley aao. Jaldi sey laga doo"—"get something man. Get a gas turbine. Install something

soon." They do so without thinking whether a gas turbine is good or bad. They are not bothered. They say that at least the present shortage should end. Everyone thinks of today. The energy and population problems can be solved only by long-term planning.

[VIEWPOINT] Why is this whole thing so secretive?

[Khan] Because of the classified nature of our work. We are involved in highly sensitive research.

[VIEWPOINT] What are the reservations in opening our installations to inspection?

[Khan] The International Atomic Energy Association has the responsibility to ensure that all the plants and facilities which are under its control are regularly inspected so that there is no diversion of plutonium or uranium to military purposes. If KANUPP or the reactor at PINSTECH are under safeguard, they can inspect it. But if we do not submit any installation to inspection, the IAEA has got nothing to do with it. Generally, two categories of nuclear facilities come under the IAEA's purview—(a) whose sale deed includes safeguards, and (b) when a country itself decides to impose safeguards on any of its facilities. Our position is that any facility that we buy from another country, the IAEA may inspect these. But anything that we make ourselves we won't submit for inspection. The IAEA should trust us.

[VIEWPOINT] At the same time, we keep hinting about our weapon level capabilities....

[Khan] This is wrong. We also need a coherent nuclear policy. In our nuclear policy at present there is certain confusion as in the Gulf policy. Irresponsible things are being said.

[VIEWPOINT] Is PAEC a statutory body?

[Khan] Yes it is. We are responsible for all atomic energy activity. Kahuta is an offshoot of the PAEC. In 76-77, we asked some of our people to start working there. Now that is causing problems because they are not controlled as much as we are. The PAEC is a responsible and accountable Government organisation. Our accounts are regularly audited by the Government. Everything is done systematically with some discipline. They work on their whims.

[VIEWPOINT] Where do you draw a line between science and technology?

[Khan] Science is the pursuit of discovery in terms of production for economic benefits. Technology also requires a great deal of know-how because scientific discovery is simply a game of principles which can be applied. If your technology lacks that scientific base, you cannot innovate, you cannot improve.

[VIEWPOINT] Doesn't that scientific base include a society where a significant number of its people have a

scientific approach, which allows discussion and dialogue because [of] scientists? Science cannot progress without questioning, dialogue or discussion.

[Khan] You are right. I think we must make science a part of our culture. If our attitude is that we can solve problems through an emotional or sentimental approach or just by issuing edicts and fatwas, if everything is taken for granted or we accept things as absolute truths, then it is not a scientific society. It must be analytical. Science is something which never claims finality. It always says that at this moment this is the truth. It always says this is an improvement. Even Einstein was trying to improve upon his theory before he died. If someone says tomorrow that Einstein's theory of relativity had some limitation, it does not mean that his greatness is being challenged. Einstein drew on the Newton discoveries to make his own contribution. This does not mean that it belittled Newton's contribution or that Einstein had this in mind. Newton had made his own contribution to science. But with the theory of relativity we began to understand things better.

[VIEWPOINT] The scientists who say that they are producing or this you are trying that, [as published] come from a cultural background of taking things in absolute terms. Some of them who are studying Einstein, may still be wearing amulets. How do you intend to transform them into proper scientists?

[Khan] This is the training that we try to give them here. We teach them the scientific method. The most important thing in science is the scientific method. Science is not the number of facts a person knows. Facts are always there. The important thing is how to analyse these facts. How did we get to a certain stage of knowledge. If we want to go forward, then questioning things becomes essential. A scientist can't be afraid of asking, challenging. That is science. Challenging, not in an emotional way.

[VIEWPOINT] But in our society anyone who asks questions is treated as a rival or an enemy.

[Khan] That is a tragedy. Our society, as it is constituted at present, is not conducive to the development of science.

[VIEWPOINT] What effect do you think the Gulf war will have on nuclear proliferation?

[Khan] I think that the Gulf war has indicated that future wars will be wars of technology, weapons which are precise, which are deadly, which are diversified. The war indeed will give an impetus to non-conventional weapons. It is possible that people may start thinking about chemical weapons.

[VIEWPOINT] Should one still condone the promotion of such developments in science which have the potential of taking a destructive dimension?

[Khan] The politicians have a tendency to misuse science. It is human nature to misuse knowledge. This has

led to destruction in the past. We need to educate the decision-makers around the world. Our survival depends on sticking together.

Professor on Long-Term Consequences

91WP0084C Lahore VIEWPOINT in English 7 Mar 91
pp 19, 29

[Interview with Anees Alam, physics teacher at Punjab University; date and place not given]

[Text] "If you want to develop nuclear energy, then you must develop the infrastructure. The first thing is that you should have the expertise you need to train scientists and develop technology for that," says Anees Alam, who teaches physics at the Punjab University.

"In the last 20 years one has not seen any sign or steps being taken towards that goal. One example is that they have not developed any studies in nuclear physics in the Pakistani universities. The standard of teaching physics has fallen. The physics that is being taught at the university and college level is the same that was being taught in the 50s. There has been no change in the syllabus, so if you really want the field of nuclear physics to develop then you have to develop a more applied approach in teaching physics at our campuses. Research facilities at our universities are almost non-existent. It does not make sense to us that when you are making such huge plans, that you are going to increase the component of nuclear power in total energy, if one looks around, the back-up facilities are nowhere to be seen."

[VIEWPOINT] But they have developed this Centre for Nuclear Studies (CNS) in PINSTECH.

[Anees Alam] But you see the CNS again take students from our universities. The CNS may be able to train them in various specialised areas—but nuclear physics as a whole, I am not very sure whether they will be able to do that.

[VIEWPOINT] Why?

[Alam] For the very simple reason that this just one institution does not have enough staff and facilities to teach.

[VIEWPOINT] The people at PINSTECH claim that they are doing research in chemistry, electronics and other such branches of science.

[Alam] Look at the total manpower involved. This is by no standard comparable with the countries where such efforts are going on and which have really been able to make some breakthrough in the field. Take the case of India. There the number of staff involved in their atomic energy programme is at least 100 times larger than what we have in Pakistan.

[VIEWPOINT] Their programmes must be more ambitious.

[Alam] Our projects are no less ambitious. If you are only thinking of buying reactors from abroad and only maintaining them, then you will not really need highly qualified manpower. This is what we have been doing at KANUPP and have not been able to add a single kilowatt of nuclear power into our national electricity grid. But if you look at PAEC and Kahuta, more than half of the budget goes there but the effect is nowhere to be seen. This is what worries people like me that you are putting all your eggs in one basket and starving other sciences without any tangible results to be seen.

[VIEWPOINT] What do you suggest, because the only people who seem to be thinking or doing anything about the energy problem are the AEC people?

[Alam] I think this is again not correct. If they spend even one per cent of the amount that they are spending to develop nuclear energy on conventional resources they can meet their requirements much more readily. Look at hydro-electronic potential in one country. We are all the time trying to go for big dams like Kalabagh. When Kalabagh fell through because of political reasons then we simply abandoned work on hydro-potential. Our hydro-potential is tremendous. If we spend money in this direction and develop small projects at different places it will not only provide jobs to a far larger number of engineers and personnel but will be safer and cheaper. It will provide electricity in areas where it is not feasible to supply.

[VIEWPOINT] Do you as a scientist support the development of nuclear energy for peaceful purposes?

[Alam] In the early 50s when atomic energy came on the scene it was projected as the solution to the problem. At that time much attention was not paid to problems like disposal of its waste, accidents in nuclear installations and also of the safety of those who work in these installations. It was a kind of hard sell approach. Even after 45 years of experience with nuclear energy we still have not got a really safe procedure for the reprocessing of the waste or its dumping. Those who are in favour of nuclear power give very interesting arguments and statistics. They say that the ratio between per million kilowatt of energy produced and accidents at a nuclear power plant is much less than the ratio between electricity produced and accidents at our power plants. This is a faulty approach. The important thing to be realised in the case of a nuclear power plant accident is the consequence. It is not that accidents don't happen at other power stations; perhaps more people get killed and the consequence may be bigger but they are localised, both in time and space. This is the main point for the people who are campaigning against nuclear power. The possibility of an accident may be minimal but when and wherever accidents happen they are too drastic. Look at Chernobyl: its fallout was received even in Pakistan.

[VIEWPOINT] In the 50s you said people were not aware of the affects of nuclear energy. You mean to say not even radiation?

[Alam] People knew about the effects of radiation. The work with radioactive elements had started in the early part of the 20th century. The awareness of hazards came very slowly only after so many people had died because of exposure to radiation. Even Madame Curie was sick because of radiation.

[VIEWPOINT] There are hundreds of nuclear reactors and tons of plutonium and uranium available in the world. Can anything be done with these installations if the world decides to say good-bye to nuclear energy? All these reserves had to be used somewhere. Can these installations and radioactive material be converted into some less hazardous matter and put to some use?

[Alam] Yes, there are hundreds of nuclear power plants. The situation is that in the developed world, in countries which really initiated nuclear power programmes, even there hardly any new order has been placed for a nuclear power plant in the last 15 years and many countries have passed legislation that they will not use nuclear energy for power generation in the future. A number of countries have already started decommissioning their existing plants. Usually a power plant has a life span of 30 years. They have no plans for making new nuclear power plants; they will simply run down the existing one.

The second part of your question is about what to do with the existing piles of fissile material. These materials become dangerous only when they are allowed to accumulate in a critical quantity. If they are not in a critical quantity they are not dangerous. The critical fuel quantity is the nuclear energy produced in nuclear reaction. For a nuclear reaction to take place a minimum amount of matter is required. The plutonium or uranium has to be in certain quantity known as critical mass before the nuclear reaction starts on a continuous basis. I am not opposed to the use of nuclear radiation in medicine and other such uses. We will have to live with nuclear energy. My fear is that the nuclear industry having lost its home market will like to push it in the Third World countries. There is a power shortage in these countries and the propensity among the policy-makers is too gloss over the long-term consequences of nuclear energy.

Economist Urges Regional Approach

91WP0084D Lahore VIEWPOINT in English 7 Mar 91
pp 29-30

[Interview with Omar Asghar, economist: "On Equal Footing"]

[Text] Omar Asghar is an economist and also a political activist. He believes that there is need to develop a regional approach to national security issues, including the nuclear option.

In an interview, he said: "Particularly since the Americans have decided to reduce their aid to Pakistan because of our refusal to open our installations for inspection, the demand of the moment is a self-reliant economic policy. Certain people don't see any harm in

having a bomb. In my view the U.S. aid is not such a big component (not even ten per cent) of the total aid received by Pakistan. America itself is facing financial problems and they are not able to disburse as much aid as before. Their priorities have changed after Afghanistan. On the nuclear issue, I feel that we have been following a very ambivalent policy. The public wants to know what is happening especially after what has happened in the Gulf where Iraq is more or less being annihilated by the Allied forces. A feeling prevails among the public now that we should not be apologetic about the issue. Some economists also feel that if American aid is completely cut off, it wouldn't be a disaster."

"I am not talking of complete autarky but it will do a great deal of good to us. There are new centres of power emerging who will be prepared to advance aid on fairly reasonable terms."

[VIEWPOINT] Irrespective of the U.S. attitude?

[Omar Asghar Khan] I think France's attitude has been different throughout. Other European countries also would like to have a more long-term perspective vis-a-vis Muslim countries. They would like to have an independent and more reasonable approach.

[VIEWPOINT] Do you support the nuclear option?

[Khan] What I am trying to say is that a strong section of intellectuals believe that if we decide to go nuclear, that will help Pakistan to establish a new relationship with other countries in the region. Then we can discuss the question of having a nuclear-free zone on an equal footing and India will also feel obliged to consider the proposal.

[VIEWPOINT] Do you think that there is an alternative way to a good relationship without going nuclear?

[Khan] I think we need to develop a regional approach to national security issues. That will mean having a close relationship with Iran. Also try to have a relationship with India on a new footing. Although Kashmir is a problem, but in a long-term perspective I think we identify culturally more with India than with the West. We also share a common heritage, common culture and civilisation; we should look to improve our relations with India. But basically on the basis of equality, I don't see going nuclear as a deterrent, as an obstacle, in having a relationship. If you do go nuclear they would like to talk to you and then I think the possibility of a nuclear-free zone can become a reality. But the public wants to know the status of our nuclear programme.

[VIEWPOINT] Purely in economic terms do you think that the nuclear option is a viable option for a country like Pakistan.

[Khan] No, in economic terms it is not. Already the resources that have gone into the nuclear programme are much bigger than our achievements. The public need to know how much has been spent, where has it been spent, what stage of development are we in. There isn't any

economic impact of nuclear energy sources being used in our economy. The demand for energy in our economy is going to increase. Our hydel power resources like thermal and coal make hardly any contribution.

At the moment we have a fairly large gap between demand and supply of energy. The potential for hydel power is enormous. According to some estimates its close to 35,000 MW. That is the actual demand estimated. Whether it is feasible to develop hydel power is a different matter.

[VIEWPOINT] This argument about energy for development, what if we instal all the industry will there be a market for our products?

[Khan] I think energy is the major constraint. Energy cost is a fairly small component of the total cost of production compared with raw material, labour and capital cost. It may be a little less or a little more in different industries. I think the market constraint will not be that big nor will it be in terms of competition. There are other bigger constraints, like efficiency levels, technology, training of manpower, etc. In terms of our production flow there are failures caused by interruption like load-shedding or shortage of energy.

[VIEWPOINT] It is said that most of our research and development funds go in the development of nuclear energy.

[Khan] That is also one constraint. There is a bias towards the development of nuclear energy and industry is being neglected because of that. On the other hand, I think the nuclear programme has also advanced research and development in Pakistan. Now you see scientists having worked in this programme contributing in other fields like electronics, chemistry, etc. On balance, yes, it has gone into nuclear programme.

General Pataudi on Bomb for Security

91WP0084E Lahore VIEWPOINT in English 7 Mar 91 p 30

[Interview with General Sher Ali Pataudi: "The Gulf War and the Bomb"; date and place not given]

[Text] Should Pakistan have the bomb? "We must have one now after what America has done (in the Gulf)," says General Sher Ali Pataudi.

But, it was pointed out in an interview with the general at his Lawrence Road residence, weren't the hazards involved in having a nuclear bomb considerable?

[Sher Ali] There are hazards even in having a revolver. You see there are hazards, but what do we have these weapons for? For protection. I doubt if there is any country which will say it has weapons to conquer its neighbour; weapons are for self-defence. I think this Gulf War has forced people to ask this: how could the United States do all this? Just because it had all these sophisticated weapons. The United States is responsible for the

given state of the world today. When the Shah of Iran fell, Saddam Hussein was armed by the Americans with money taken from Kuwait and Saudi Arabia. Their policy then was to build an Arab ally and Saddam at that time was saying that I am a socialist, I am a Baathist. He did not talk of Islam. The Americans said here is person identified as an Arab: they should arm him and he will listen to them and could be used against Iran. That is exactly what happened. During the eight-year war between Iran and Iraq, the Super-Powers showed no desire to stop it. They tried out their chemical weapons, they tried out their gas, and eventually both sides decided to stop the nonsense.

I know the American mind. There is no morality left. God is just on the dollar bill. There is no God. Money has become god.

[VIEWPOINT] You seem to reject the moral argument against the bomb.

[Sher Ali] No. I don't. I say this, that after the Gulf War, the manner in which this war has been fought under the farce of morality—there was of course no morality in it—in the manner in which the bombs have been rained on Iraq which had nothing to do with Kuwaiti territory, the moral argument becomes a little thin.

[VIEWPOINT] Coming to weapons, you said that people have revolvers too. I would like to point out the hazards of weapons like revolvers are localised but in the case of nuclear weapons or installations, the hazards in case of a nuclear accident have no limits of time and space.

[Sher Ali] Nothing is beyond human control. What has to be controlled is the human mind. It is the ultimate weapon, not the nuclear bomb.

[VIEWPOINT] What I meant was radiation.

[Sher Ali] This is also connected with the mind. If the human mind has been upset or become irrational, no-one can do anything about it. Look at the recent example in your country. The Government is saying one thing, the public is saying another. You see it is the mind.

[VIEWPOINT] What do you think of the nuclear option as a deterrent, particularly when in India and Pakistan, there appears to be divine sanction to kill people for religion. If we have the bomb, wouldn't we explode it?

[Sher Ali] My dear, sir, I am not worried about jihad. What you are saying is quite philosophical. I would like nuclear know-how of the most sophisticated kind to solve the energy problems of Pakistan. We need to be able to produce cheap electricity. The world is on the threshold of the 21st century and we can't assure a regular supply of electricity to our people. I agree people are emotional, they are uneducated. Yesterday, they were opposed to Saddam Hussein, today they have made him their hero. This is the present of Mr. Bush and the Gulf War to us.

[VIEWPOINT] Even the argument about nuclear energy being safer and cheaper is no longer credible even in countries which started with nuclear technology. No more new orders for plants are being placed and governments are not commissioning previous reactors.

[Sher Ali] They are doing this because they don't need these any more. It is not because nuclear energy has become unpopular. We as a nation do not have any direction. I have always believed that one can exist without friends, one cannot live without neighbours. Here our entire policy has been anti-India. You are right when you say that if we have the technology and we commit an irrational act, there is a great danger. I do agree. But what is the answer? My suggestion is that to avoid this situation, if Pakistan has the biggest weapon of all, like the others do, there is a possibility that nothing will happen. If you think this hazard can be avoided on the basis of some moral argument, this is not possible. This the contribution of the American policies—that those countries which were not nuclear now will strive to go nuclear for their own security. There will be an arms race.

[VIEWPOINT] Do you think there is an alternative to this nuclear option theory in our foreign policy?

[Sher Ali] Do we have a foreign policy? The tradition of Pakistan has been to react. There are no plans. Your entire foreign policy has been anti-India.

[VIEWPOINT] Should two neighbours be uniformly armed for them to have harmomoirs relations?

[Sher Ali] There are two attitudes. Either there should be strength of love and understanding of each other's problems and concern for the betterment of the poor. Or both should be armed. What I am saying is that Pakistan, if it has the knowledge, should experiment if it can. It should tell the people that we want to live as friends, but if you have the capability, we too have that. Nobody wants war.

Physicist for Education, Not Bomb

91WP0084F Lahore VIEWPOINT in English 7 Mar 91
pp 31-32

[Article by Pervez Hoodbhoy: "Can the Bomb Enhance National Security?"]

[Text] Should Pakistan seek to acquire nuclear weapons? On this highly charged issue, simple moral and economic arguments are not by themselves sufficient.

Morally, no nation has the right to possess an atomic bomb, the ultimate weapon of mass extermination. That one section of the human race, or a group of individuals belonging to a section, should possess the power to eliminate at will a portion of this species is an abomination and a perversion. Every nation which possesses this power—the USA, USSR, Britain and Israel—is morally culpable. So are those nations which aspire towards the same goal, but which have not quite reached it. Our neighbour India is among these.

Economic arguments also militate against the acquisition of nuclear weapons. The resources committed to "defence" in the industrialised nations, much of which have been used for building nuclear arsenals and their support systems, has deprived large sectors of those societies of important necessities. In the United States, the rapacious appetite of the military-industrial complex has resulted in a fundamentally imbalanced society—an impoverished public health and education system, heightened racial inequalities, and recession. As for the USSR, the perceived need of its defence establishment to keep up with the Americans led to such vast over-spending that the collapse of the Soviet economy is imminent. For Third World countries, the real cost of pursuing nuclear ambitions is bound to be immensely greater.

Although the bomb is morally indefensible and expensive, it is a fact that nations do seek to acquire it whether it be for reasons of security or latent aggression. Since Pakistan is not in a position to agress, any effort on its part to acquire nuclear weapons would be to protect itself. So, to my mind, the real question that we should ask is: will the acquisition of an atomic bomb enhance Pakistan's national security? Would it make us safer, or would it have the opposite effect? These are complex but very important questions.

Unfortunately our national leaders have shied away from addressing these questions. No truthful debate has yet taken place, only mere reiterations of tired arguments are ever heard. There appears to be an unshakeable belief that having the bomb permanently assures protection against aggression. Behind this belief, I think, there is an apocalyptic, mythodological vision of what a bomb is—an instrument of unlimited destructive power. But this vision is simplistic and dangerously misleading for several reasons.

It is crucial to recognise that although a single bomb is very destructive, its power to destroy is finite. What this means is that in order for a nation to be a credible nuclear power, it is not sufficient to possess one nuclear weapon or two, five, or even ten nuclear weapons. A true nuclear State must possess an arsenal with many nuclear bombs at disposal. These bombs must be:

(a) reliable; (b) efficient; (c) deliverable.

I would now like to amplify upon these requirements.

Reliability must be absolute, meaning that if you drop an atomic bomb then it should explode. Imagine the consequences of a failed attempt! It would be more than just embarrassing; there would be terrible retribution without achievement of any military or security gain. Reliability is not an easily achieved goal for weapons designers. Not only must the basic design be stable against small variations of the purity of the fissile materials, but various parts of the bomb must be machined to exact specifications and meet pre-determined standards of quality and strength.

Efficiency is equally crucial. Most people have probably heard that it takes about 10 kg of uranium of about 95 per cent purity, or about 25 kg of plutonium, to make a bomb similar to the one which was used on Hiroshima. However, the amount of destructive power in these fixed amounts of uranium or plutonium is not a fixed quantity. This power depends upon how you have designed the bomb, the geometry of the neutron reflectors, the speed with [which] the pieces come together initially, the various impurities which are present, and the pressure build-up just prior to the explosion. There are so many variables that the yield can range from as much as 20 kilotons equivalent of TNT to as little as one kiloton, or even less. The point is that the destructive energy can have a very large variation from bomb to bomb, depending upon how cleverly it has been designed and how well it has been put together.

Deliverability is an obvious requirement. Unless the nuclear device is designed to be relatively compact and light, it cannot properly be called a weapon. To go from the stage of a large, crude test device to a small but high-yield bomb which can be carried by an aircraft or rocket is said to require as much effort as making the first test explosion.

Pakistan is said to be capable of making some crude nuclear devices. There are no secrets about this—this has been reported several times in the international Press and it appears to be a plausible estimate. But in all probability, these will be very few in number, and of suspect reliability and efficiency. Remember, we have only one small nuclear power reactor, and that too was gifted by the Canadians to us years ago.

Compare this with India: the Indians have a well-developed scientific infrastructure which is far advanced relative to ours. They manufacture their own reactors of which they have several, and have an extensive industrial base. Should they choose to run the nuclear race, they would outstrip us instantly. Indeed the hawks in the Indian establishment are waiting for Pakistan to explode the bomb. That will be their day of greatest jubilation. So far it has been possible to restrain them. I should qualify here what "restraint" means.

The explosion by India, in 1974, of something they called a "peaceful nuclear device," was an unprovoked act. It was also totally unnecessary. It had no economic consequences of benefit either. Over 16 years have elapsed since then, and there is not a single peaceful use which they can point to. Beyond doubt, the blame lies with India in provoking an atomic race on the subcontinent. However, there is still an element of restraint which remains. India has not, at least as yet, gone for a full-fledged development of nuclear weapons. It has not, to the best of our knowledge, developed an arsenal, they are waiting for an incident to justify that. Pakistan's explosion of a nuclear device would give the hawks in India an opportunity to forge ahead with its nuclear programme to the fullest extent.

Let me state unambiguously that I have no regard for the policies of the Indian Government, which I regard as excessively chauvinistic and bellicose in regard to India's neighbours. But this does not constitute a valid justification for Pakistan to embark on a nuclear race against India. From the point of national security, and the necessity of ensuring a future for our children, I believe that it is criminally foolish to take on a race which we cannot possibly hope to win.

To follow an alligator into the water and fight it there is the ultimate folly.

For those who insist that we must meet the Indian challenge, let me point out that we have long stopped competing with them in science or education—the stuff out of which modern civilisations are built. To build a strong Pakistan should be the goal; this is beyond dispute. But strength is not acquired by secretly building bombs. Instead, it comes from creating a society based on consensus and wisely addressing issues generated by ethnic, linguistic, and class divisions in our society. Strength comes from making a strong infrastructure for science and technology. And, strength is acquired by promoting education and enlightenment. True national security and stability lie in that alone.

Management of 'Bomb Factory' Criticized

91WP0084G Lahore VIEWPOINT in English
14 Mar 91 pp 17-18

[First paragraph VIEWPOINT comment]

[Text] As part of an effort to stimulate a debate on Pakistan's nuclear option, VIEWPOINT last week had published an interview with Mr. Munir Ahmed Khan, Chairman of the Pakistan Atomic Energy Commission, and the view of an eminent nuclear physicist, a politician-cum-economist and a General. This week we carry an interesting article relating to a book "The Islamic Bomb"; which provides a small glimpse of the working of our nuclear establishment, and an account of a visit to PINSTECH by Zafaryab Ahmed:

What PINSTECH Is Doing

The Pakistan Institute for Nuclear Science and Technology (PINSTECH) was the first outfit established by the Pakistan Atomic Energy Commission (PAEC) in the early 50s to conduct research in fields related to the development of atomic energy.

When construction work started on the project at a place called Nilore on the outskirts of Islamabad in 1963, the Nilore bus stand came to be known as the "bomb factory stop"—perhaps because of the association among ordinary people with atomic explosions.

The Institute houses the first 5 MW nuclear research reactor donated by the U.S. Government under its Atoms for Peace policy. The reactor became 'critical' on December 31, 1965. It took another nine years for the

various laboratories and workshops to become operational and the auditorium and the library to be completed. By 1974, PINSTECH was running "well-formulated goal-oriented projects."

Designed in grand style, the building at first sight is quite deceptive. It overaws its visitors. The dome or the cover over the reactor looks like some archaeological site. Is this tomb also part of PINSTECH?, I asked Mr. Anwar Ahmad, the PAEC PRO. "This is what you have come to see. It was designed by the famous architect Edward Durrell Stone and he has won an international prize for this elegant structure."

Sitting in his office, Dr. I.H. Qureshi, the head of PINSTECH, tried to explain to me the difference between ordinary uranium and weapon-level uranium or how plutonium was made and also what the fuel cycle was. He emphasised at each and every step that the entire exercise was aimed at the development requirements of the country. "The reactor that we have is of very low potential. We have used it more than anything else to train our staff. We have over these years gained a reputation as one of the best institutes for pure and applied research in nuclear science."

Reprocessing waste, he said, was not a problem. "The quantity is not that big and it is low radiation waste. Then, we have quite safe storage points, like our uranium mines where we are able to monitor the storage."

"Occupational health and safety is one of our main concerns. We maintain all the standards prescribed; our health physics department is quite effective and efficient. We monitor all the emissions from our laboratories. Our Standard Dosimetry Laboratory carries out calibrations of radiation equipment and also to monitor any unforeseen criticality accidents."

During the chat, Mr. Qureshi, while describing the achievements of PAEC, said: "We at the moment with indigenous expertise are involved in upgrading the 5 MW reactor to a 10 MW reactor and also trying to convert its core to use low grade uranium. Our engineers have already fabricated a new control panel with enhanced facilities which works more efficiently than the original one. The safety measures have also been improved."

The reactor at PINSTECH needs 90 per cent enriched uranium to run—weapon grade uranium—which is no longer available. "The upgraded reactor will need 20 per cent enriched uranium and a friendly country has promised to provide that."

After the brain-blowing lecture about the institute and various processes of nuclear research, Mr. Anwar Islam, one of the scientists there, was entrusted with the job of showing me the reactor. Before that, he took me to the library and the display centre of PINSTECH. Though I was not taken to any of the laboratories, Anwar Islam told me that a number of laboratories were involved in

basic studies in areas beside atomic and nuclear physics—condensed matter and plasma physics, crystal growth and crystal structures, micro structures of metals and alloys and computer modeling.

The reactor had been dismantled for changes and improvements. Anwar Islam tried to explain how it functioned and the measures taken to avoid radiation risks, the remote control hands, monitoring of staff and so on.

The water from the tank was being shifted to another place to change the tank's lining. There was massive seepage on the upper chamber of the reactor about which Mr. Anwar Islam said it was normal and there was nothing hazardous about it. The reactor, besides being used for a variety of research and development projects, has been used also for the production of radioisotopes. In addition to operating the reactor and measurements of reactor parameters, indigenous expertise has been developed in theoretical reactor analysis. Then I was taken to the new 27 KW research reactor that Pakistan has got from China. This too is being used to train students.

PINSTECH has developed a plant to produce reactor grade uranium dioxide, the fuel used at the Karachi nuclear power plant (KANUPP). For the last so many years, PINSTECH has been meeting all the fuel requirements of the Karachi plant.

Scientists outside the PAEC are quite 'suspicious' about its activities and claim: 'We do not know anything about what goes on in there. The whole thing is quite secretive. There is no information available except the one revealed by the Chairman,' said one science teacher at a local university. Inside PINSTECH there is a nuclear studies centre. A visit to the NSC was short and confined to a briefing by a local staff member and a visit to the computer section. The students seemed listless, without any spark. So very essential to disagree and ask questions.

"There is a lot of grumbling in PINSTECH. This is something you should ask about during your visit," I was advised by a friend who has friends working there. "It is very difficult to leave the Institute. Except for a hundred or so—those in the upper layers of the establishment—the rest, if not incompetent, are unhappy," said a PINSTECH employee who has managed to leave. The PAEC Chairman, when asked about this, said it was essential for this kind of institute. But he said they could leave in the first six months of joining.

The employee also charged that both Mr. Munir Ahmad Khan and Dr. A.O. Khan, "the bomb man," were "over and above the law of the land. The law does not permit persons in such sensitive positions to have foreign wives. A.Q. Khan's wife is South African, while Munir Ahmed Khan too has a foreign wife." For him the reason for all the secrecy was the substandard level of the research at PINSTECH rather than anything else. "You will hardly find any research paper about the work being done at

PINSTECH in a foreign journal. There is no mobility of scientists. They do not get an opportunity to interact with people involved in similar kind of work in other countries. In the absence of these two things, neither the quality of research can be ascertained nor can it be improved.

"You will be surprised to know that Munir Ahmed Khan is neither a nuclear physicist nor a working scientist. A.Q. Khan except for his own claims about his success at Kahuta, has only the charts of the nuclear plant that he brought from Austria to his credit."

Revision of Book Rekindles Leaders' Feuds

91WP0084H Lahore VIEWPOINT in English
14 Mar 91 pp 18-20

[Article by Von Hunoze: "Who Changed 'The Islamic Bomb'"; all punctuation as published]

[Text] The reprinting of the proscribed book *Islamic Bomb* in Pakistan, with many alternatives, raised many questions regarding the so-called feud between the leaders of the nuclear establishments of the country.

It was a bright morning in March 1983. The cheerful spring atmosphere of the office was disturbed by the entrance of a despatch rider who looked much like an Army Havaldar. He seemed to be in a hurry, and thrust a large brown unmarked packet before the clerk. "Sign here", he said, indicating a place on the sheet of paper that he was carrying. Puzzled over the intrusion, and intrigued by the haste, the clerk asked who the package was from. "What is it to you?" was the curt reply. "I have a lot of work ahead. So would you please sign and let me go?" After getting the signature, the rider disappeared as mysteriously as he had appeared.

More or less the same story was repeated that day—and the following few days—in a large number of offices in Islamabad. A number of high officials in the various ministries, directorates, and commissions received identical packets. Each packet contained a copy of the book "The Islamic Bomb" by Steve Weissman and Herbet Krosney.

Recipients of the book were somewhat taken aback because the book was known to be proscribed. The "Islamic Bomb" had been alleged to be Zionist propaganda against Pakistani efforts to acquire nuclear technology. The book contained what it said were surreptitious efforts by Pakistan to buy equipment and material necessary to manufacture nuclear bombs. A fair measure of detail was contained in the book: names of important individuals connected with the atomic effort, their web of connections, and suppliers of equipment. The Government of Pakistan had declared that this material was false, and had therefore prohibited sale of the book within the country. How then did it come about that the book landed up unasked for at the door step? Could it be a conspiracy of the Indo-Zionist lobby to influence public opinion in Pakistan by supplying the proscribed

information to the Pakistani intelligentsia free of cost? Who were the despatch riders? Were they Indian agents, working boldly in this country? Whatever the reason, the recipients of the book read it with relish, if only because it was prohibited.

Then something happened. Somebody somewhere had a copy of the "Islamic Bomb" that had been purchased abroad. Comparing notes with those who had read the freely supplied books, he found that there were some amusing differences between the two. For example, there were variations in the names and in the characteristics associated with some of the main characters. Closer examination showed that in the freely supplied book some selected pages had, in fact, been rewritten and reprinted. The free version turned out to be a Pakistani print of the proscribed book, in which much of the original printing was reproduced, but selective portions had been deliberately altered.

It was quite evident from the copyright page that the freely distributed version was a pirated edition of the original. Although there was an inserted typed line saying that it was a "Revised 2nd Edition," yet the page showed the same ISB number, contrary to the established practice of every new edition being given a different ISB number. All the pages which were changed and reprinted had a discernibly different type-set. The new type set was remarkably similar to that used by local publishers. Moreover, the altered pages contained some typical typographical errors of the type more likely to occur in Pakistani publications. For example, page viii had the page heading "foreward" instead of the original "foreword." As another example, page 77 of the original book contains the phrase "highly enriched uranium," but the same page of the pirated version has "highly enrich uranium."

In all, nine pages of the book were changed in the pirated edition: the back cover, the inside cover and seven other pages—numbers viii, 47, 174, 177, 182 and 198. Curiously, all the changes were aimed towards the derogation of Munir Ahmed Khan, Chairman of the Pakistan Atomic Energy Commission, and towards enhancing the image of Dr. A.Q. Khan, Director of the famed Kahuta laboratory.

Take, for instance, page 47 of the two books. The fourth paragraph in the original book reads as follows:

"To others with whom we've spoken, Munir Khan is a patriot, a man who would do anything and everything to bring atomic power and atomic weapons to his homeland... As a scientist, he is said to be competent, though by no means brilliant."

In contrast the same paragraph in the pirated edition reads as follows:

"To others with whom we've spoken, Munir Khan is not a patriot, would do everything to keep atomic power and weapons away from Pakistan.... As a scientist, he is said to be incompetent as he is just an electrical engineer."

On the same page, the original book says:

"Although Munir Khan refused to answer our questions, he made little secret of his disdain for many of his nominal military superiors. Yet he has somehow retained their confidence and is still the man in charge of the bomb project."

In contrast the pirated book changed the paragraph this way:

"Although Munir Khan refused to answer our questions, he made little secret of his hatred for many of his nominal military superiors. Yet he has somehow retained their confidence and is still the man in charge of the reprocessing project."

Another example of the effort to discredit Munir Ahmed Khan is found on page 182. The second paragraph of the original book says:

"The Pakistanis called the new initiative Project 706, and as with the reprocessing programme, it was under the overall supervision of the Pakistan Atomic Energy Commission and its chief Munir Ahmed Khan."

The pirated version, on the other hand, read:

"The Pakistanis called the new initiative Project 706 and as with the reprocessing programme, it was under the overall supervision of the Prime Minister, Mr. Z.A. Bhutto."

The changes in favour of A.Q. Khan are spread at various places. Starting with the back cover, the original paragraph:

"The Islamic Bomb sums up the startling story of the Pakistani metallurgist, Dr. A.Q. Khan, and how he stole the bomb for Islam by penetrating a nuclear plant in Holland and getting the knowledge and the supplier lists that would enable the Pakistanis to build the bomb on their own."

Is changed in the pirated edition to:

"The Islamic Bomb sums up the startling story of the Pakistani metallurgist, Dr. A.Q. Khan, and how he made the bomb for Islam by working at a nuclear plant in Holland and getting the knowledge and the supplier lists that would enable the Pakistanis to build the bomb on their own."

On page 174, at the start of Chapter 12 of the original edition, the following quotation from Dr. Georges van der Perre of the Catholic University of Leuven, Belgium, about Dr. Abdul Qadeer Khan was printed in an inset.

"He was an amusing person. For instance, he was always offering cookies and sweets to the secretaries because in his idea a girl should be a little fatty."

In the altered edition, that quotation was deleted, and replaced by an excerpt from Dr. Khan's letter to DER SPIEGEL. Amusingly enough the same quotation of Dr.

Van der Perre, appearing again on page 177 of the original book, was replaced in the pirated edition by:

"He was an amusing person. For example, he was always participating in all social activities and telling nice jokes. He was a very nice company."

On page 174 of the altered version, the sentence "Dr. Khan was the answer," was added to the second paragraph.

It appears that the person who brought out the pirated version of the book was absolutely intolerant of any adverse remark against Dr. A.Q. Khan. For example, where the original book quotes Dr. Van der Perre on page 177 as saying,

"Khan had his own Pakistani accent that sounded funny a little bit,"

It is replaced in the changed book by,

"Khan had his own Pakistani accent that sounded a little bit strange. He had perfect command on German."

Similarly, on the same page, the original phrase "he was married to a Dutch wife" was replaced in the altered version by "he was married to a lady of Dutch origin."

One other remarkable aspect of the pirate edition is a rather vengeful attempt towards discrediting a certain Mr. S.A. Butt. Any mention of him in favourable terms in the original book has been changed into the opposite. For instance, on page 182, the entire half a page on Mr. Butt was changed. The original read as follows:

"Much of the buying itself fell to a network headed by a superb man in the field, Mr. S.A. Butt. One of the participants at the original meeting in Multan, Butt had caught Mr. Bhutto's eye when he jumped up and shouted that the bomb could be built in three years. He was obviously wrong but his enthusiasm won favour, and in July 1975, he was posted to the Pakistani Embassy in Brussels, in charge of science and technology.

"In Brussels, and later in Paris, Butt spent much of his time working on the reprocessing side with Belgonucleaire and SGN. At the same time he also became the chief purchasing agent in Europe for the items on Dr. Khan's shopping list, and was almost certainly the man responsible for the inquiry about inverters in Holland in August 1975.

"Far from a super secret band of smugglers, Butt and his colleagues pursued their purchases in a surprisingly open way, at least at the start of their buying campaign. Butt and some of the others were accredited diplomats. They worked out of Pakistani Embassies or offices linked to them. They told many of the suppliers what they were buying the components for. They made no secret of their requests. But in so doing they acted with a blatant disregard for the various national and international agencies that were supposed to be stopping the spread of dangerous nuclear technologies."

The altered version, on the other hand, replaced the above with the following:

"Though first it was believed that Mr. S.A. Butt, Minister at Pak Embassies in Brussels and Paris, was the superb man behind the purchases for Dr. A.Q. Khan, it has now been confirmed that he was responsible only for the PAEC purchases and was also responsible for the reprocessing side. The chief purchasing agent in Europe for the sophisticated items on Dr. Khan's shopping list was Ikramul Haq Khan, Minister at Bonn. He was handsome with blue eyes and an extremely capable and quiet person.

"Far from a secret band of smugglers, I.H. Khan and his colleagues made purchases quite openly. They asked for quotations and opened LCs. There was no smuggling involved. SR Int. of London and Serabit of Montreal got into trouble on their own as they ignorantly forget to ask for export licenses for items which were, any way, available off the shelf in the open market."

The person who was behind the publication of the altered edition appears to have been so unhappy with Mr. Butt that no favourable reference to him was acceptable to him. For example the original comment on page 198

"...he found the Pakistani buyer, Butt, to be personally charming, like many of the Pakistanis, and also a tough negotiator"

was changed to

"...he found the Pakistani buyer, Butt, to be 'rather corrupt like many of his colleagues, and not a good negotiator.'"

And again on the same page, the original sentence

"Butt was actually the man in charge of buying components for both the enriched-uranium and reprocessing side of the Pakistani nuclear programme"

was replaced by

"But was actually the man in charge of buying components for only the PAEC. His blunder with the enquiry for the inverters almost cost Dr. Khan his neck."

The most interesting change was made on the inside cover, where the name of S.A. Butt in the following sentence

"They expose the legendary S.A. Butt, the mysterious Pakistani who has made Pakistan's 'Islamic Bomb' feasible by acquiring Western technology"

was replaced with that of Dr. Khan.

The printing of a full-sized 400 page book dealing with a highly sensitive subject, its free distribution, and the nature of alterations made within it relative to the original version, raise some interesting questions. Who rewrote it and why? The blood feud between the leaders

of the nuclear establishments of the country appears to have found yet another battleground with the publication of the revised "Islamic Bomb."

Current Options in Nuclear Development Considered

91WP0075A Islamabad THE MUSLIM in English
2 Mar 91 pp 4, 5

[Col. (Retd.) Ikram Ullah talks about options available to the government if the present U.S. aid cut-off continues]

[Text] Pakistan's peaceful nuclear programme seems to have now entered its most crucial stage, ever since its mysterious birth in the early 1970s. For the past decade-and-a-half, the eyes of the whole world, and particularly of the USA, have been focused on it. Pakistan's nuclear policy has been one factor on which have hinged most of our Federal governments including the lives and tenures of our Prime Ministers and Presidents.

It will be a wastage of time to go into the historical details of the ups and downs leading to the present position of a grave dilemma into which Pakistan has been suddenly pushed. Everyone knows that the U.S. economic aid has been stopped, and most people know why. Military aid, including that in the pipeline, has also been dispensed with or called off. The State Department and U.S. officials visiting Pakistan have not minced words in explaining the reasons to the government of Pakistan and to the people of the country. Whereas the United States has at least been honest about its objectives and has proclaimed them without any sugar-coating, our own government has regrettably not taken the nation into confidence and has not fully explained to them the nature of the challenge that the country is likely to face in the very near future.

On the contrary, the people are being fed the notion that Pakistan, as a self-respecting nation, has decided to throw away the begging bowl, by rejecting the U.S. aid and that the government of Pakistan has already embarked on a journey of self-reliance. The objective is very noble indeed, but the gap between the declaratory policy and its actual implementation is a yawning gulf spread over many decades. There is no evidence that any steps are being planned and that the nation is being prepared to bridge this gulf.

In the meantime, many other things are happening behind the scenes that the people do not know about. This is the worst aspect of any impending tragedy, in which the nation is kept in the dark, till the final dismal hour, when the blow is described as a stab in the back or a bolt from the blue. In actual fact, nothing of the sort ever happens in inter-State relations. Both sides know well in advance when the cooking pot is on.

In our present circumstances, the U.S. mood to cook the Pakistani goose has been made evident by Washington's officially communicating to the government of Pakistan that:

- The "Aid to Pakistan Consortium" is not likely to meet in the near future. The U.S. contributes some 33 per cent of the consortium's funds.
- The World Bank may not be presently able to look into Pakistan's problems due to difficulties and other priorities of its own.
- the IMF is also under similar constraints and, therefore, unlikely to be in a position to meet Pakistan's anticipated difficulties in the economic and development sectors. This may also apply to on-going projects.
- It is doubtful that Pakistan's bilateral agreements and aid commitments with a number of countries would go through smoothly due to the latest international developments and other imperatives and compulsions.

The big question is, why has the U.S. applied such an unreasonable squeeze at this unseemly hour, when the U.S. should normally use the support, or, at least, the good will, of all Muslim States in the Gulf region? Why should the U.S. estrange at this critical juncture a Muslim population of 110 million in Pakistan? After all, our nuclear programme has not erupted suddenly that it had to be nipped in the bud.

Pakistan, in all its history, has never defied the U.S. on any vital issue. It fought the U.S. battle in Afghanistan, and acted as a conduit for the Resistance for almost ten years. In deference to U.S. wishes, Pakistan did not put its whole weight behind the setting up of a 'fundamentalist' government at Kabul. The U.S. did not want Jalalabad to fall. It did not fall. The U.S. desired to sort out the Afghanistan issue directly with Moscow. Pakistan respectfully honoured the U.S. wish. Pakistan had remained neutral during the eight-year-long Iran-Iraq War, but in the recent Gulf War, Pakistan jumped upon the Bush bandwagon, discarding the principled policy of neutrality in intra-Arab conflicts.

We have openly opposed Saddam at all official forums. Not only this; we despatched a sizeable contingent of troops to Saudi Arabia—the first venture of its size since the birth of Pakistan. In doing so, we took certain risks to our own national security on the eastern borders. We faced opposition and agitation at home. It, therefore, looks odd that on the one hand, the Pakistan government has stood firmly on the side of the U.S. in the Gulf, while on the other hand, the U.S. should be twisting a Pakistan's arm to breaking point.

Prime Minister Mian Mohammad Nawaz Sharif is, therefore, facing a crisis of the worst possible nature, the dimensions of which are hard to define. George Bush now speaks like Caesar and shows little courtesy to his court of prime ministers, presidents and kings spread

around the globe. None, including the once mighty Mikhail Gorbachev, can dare to defy the U.S. President. In this backdrop, suppose George Bush told Nawaz Sharif the other day during the much publicised phone call, "Dismantle your nuclear facility or be prepared for the consequences," is the government of Pakistan ready for a suitable answer?

What are Pakistan's options? Trade for time and run to friends, if we are left with any, for a breathing space to gain some sort of equilibrium, before our centre of gravity collapses? Our second option is to prepare the nation for a strategic defiance. The third and last option is to surrender to U.S. demands, with the humble request that the disgrace may not be made public, so that in the turmoil that is bound to follow the fatal decision, the responsibility could be shifted later to the next succeeding regime.

I shall not analyse the first and the last options, because of implications too well known. As for the middle course, namely, strategic defiance, the indicators are totally absent. Strategic defiance is not a mere term or an expression, but a well-considered national strategy, which is sub-divided into political, economic, social, industrial, cultural, psychological and, above all, military and defence strategies—at all levels and in all spheres of life.

The present situation can be summed up as under:

- There is no indication that the government of Pakistan intends to put the issue of "the squeeze" before parliament or before the people, without hiding anything.
- No practical plans are on the anvil to tighten our belts, cut down imports, plan rationing of oil, reduce energy wastage, prepare the nation to face a period of hardship if we are to survive with honour. On the contrary, imports have been liberalised and restrictions on foreign exchange movement have been lifted! As if, everything is more than well.
- No efforts are being made towards national integration and consolidation to face the challenge which is staring us in the face. The main effort of the governments at all Centre as well as in the provinces seem to be directed towards eliminating the opposition parties. Disarrayed as the political parties as well as the political system are, there seems little hope of a united front to deal with the crisis at the national level.
- In short, the government is running on a day-to-day basis. Tomorrow will take care of itself. This writer is well aware that the nuclear theme is a forbidden subject. Why should it be so in a professedly democratic system, one fails to understand. One cannot, therefore, oblige, by sweeping this issue under the carpet when Pakistan's survival as a sovereign State appears to be at stake. How shall we know the outcome? If the U.S. aid is not resumed by the end of the year, the signs will be written all over our economy. It

would signify that our strategic defiance has been put into operations, no matter what follows. If aid is, however, resumed and American love for Pakistan again warms up under one pretext or another, then we should start looking for signs of betrayal in the corridors of power.

Joint Development With China on New Missile System

BK0804083491 Islamabad THE MUSLIM in English
8 Apr 91 p 1, 10

[Article by Aroosa Alam; quotation marks as published]

[Text] Islamabad, April 7—Pakistan and China have developed a new version of anti-aircraft, shoulder-fired missile system to be known with Pakistani designation of Anza-II. The research and manufacturing of the electronic devices for the range, accuracy and detection of the target was done jointly by the Norinco Defence Industries of the People's Republic of China and the Dr. A.Q. Khan Laboratories.

Pakistan's eminent nuclear scientist Dr. Abdul Qadeer Khan who proceeded to the People's Republic of China to conduct proper tests and trials of the Anza-II with its Chinese designation of "Mongoose", said here Saturday evening, "Anza-II is the improvised version of "Stinger" anti-aircraft system which has been modified and updated by the A.Q. Khan Laboratories and the Chinese rocket and missile experts."

He said Anza-II has the capability of wire and heart seeking search for the targets and it is capable of dodging the iron-delays normally released by the invading enemy jet-fighters". [sentence as published]

He said the missile is primarily designed to protect ground formations from the enemy ground support aircraft and attack helicopters. He said like Anza-I the Anza-II will also be mounted on armoured personnel cars and jeeps. "Basically it is designed for the infantry for its being a shoulder-fired capability like the Stinger, Sam-7 and RBS-20".

Dr. Qadeer Khan who has been responsible for the manufacturing of Anza-I and laser equipment for the indigenous missile and rocket system said, "Gulf war has left many a lessons for the weapons experts across the world. We are left with no choice but to improve the hi-tech, concentrate more on research and development and develop such weapons system which can be equal to the equipment and electronics of the United States and its allied armies status.

Dr. Khan said, "following the tests and trials of the Anza-II which will include target accuracy and range in People's Republic of China and after its proper approval by the Chinese Avionics and missile experts 'Anza-II' would be inducted in the Pakistan Army.

He said, "besides the anti-aircraft missile systems Pakistan and China are also engaged in developing anti-tank missile system with Pakistani designation of 'Green Arrow'.

Nuclear Deterrence Capability Urged

91AS0529X Lahore NAWA-I-WAQT in Urdu
25 Jan 91 p 5

[Editorial: "The Atomic Deterrent—Need of the Hour"]

[Text] All India Radio, quoting the Indian paper, TIMES OF INDIA, has alleged that Pakistan will fight India using the concepts applied during "Zarb-i-Momin" exercises, and that India, stronger than ever, will retaliate effectively. India has often used such rhetoric—the apparent reason being her full readiness in nuclear and military fields.

From time to time, the Indian leadership makes protestations about Pakistan's nuclear program. This theme is then taken on by the Indian lobbies in the western countries who sing the same song.

One truth which the Pakistani leadership has explicitly declared is that Pakistan's atomic policy is not based on mere rivalry or stubbornness but on solid geopolitical realities and severe dangers to her existence.

India not only became a member of the nuclear club in 1974 by exploding an atomic device, but has more than a dozen nuclear research facilities working at a frantic pace for establishing "Hindu Hegemony." Indian atomic warehouses store 250 kilograms of ready plutonium and, within the next three years, it will produce one ton of plutonium, enough to make 100 to 150 bombs.

Israel is another country in the vicinity of Pakistan which is openly producing atomic weapons. When it comes to India and Israel, America's "Symington Amendment" becomes ineffective. Pakistan becomes the only victim, notwithstanding her explanations which are rejected out of hand. The fact is that Pakistan needs a credible "nuclear deterrent" to avoid the dangers of war permanently in the subcontinent. Pakistan should not become susceptible to any blackmail in this regard. The atomic powers have no moral right to monopolize this field and Pakistan cannot accept such a principle. Therefore, if the United States creates a continuous problem for Pakistan on account of this reason alone, the people of Pakistan should unite to resolve this situation.

The Prime Minister has rightly stated that he will not stoop and "beg" for American aid. If we stop the loot of the national treasury and take measures against those involved, we will not need any foreign aid. Official circles admit that the bureaucracy steals about 40 to 70 billion rupees annually. If this thievery is checked, not only will we control the budget deficit, but we will also have a surplus of 42 billion rupees. This money can be used for national progress and defense.

We appreciate the need for reliable friends to defend us from present dangers surrounding us. But in spite of our good faith and effort, if our friends prove to be unreliable and stab us in the back, and if as usual, America leaves us in a lurch in times of need, then the nation will have to face the dangers with determination and self-confidence.

Progress in Nuclear Development Reviewed

91AS0741A Karachi DAWN in English 13 Mar 91 p 11

[Article by Azim Kidwai]

[Text] The nucleus of the PAEC (Pakistan Atomic Energy Commission) was formed in the mid-fifties. Its progress was slow in the first few years, but it soon picked up and turned into a dynamic organisation. The decade of sixties looks outstanding. During these years the PAEC created all the institutions because of which it is known in the country and that still give it a sort of fly-wheel effect though the curve of dynamism has tapered off and even dipped since the seventies.

The 5-MW pool-type research reactor, graded as an excellent research tool at the time, as well as a good source of radioisotope production, got installed at PIN-STECH (Pakistan Institute of Nuclear Science and Technology) at Nilore, near Islamabad in 1965. PINSTECH itself, the premier research complex of the Commission, was created and got its major facilities in the same decade.

KANUPP (Karachi Nuclear Power Plant) project was started in 1966 and was nearing completion at the end of the sixties even though it was formally inaugurated in 1972.

The two major agricultural research centres of the PAEC, one at Faisalabad and the other at Tandojam, are also the landmarks of the same decade.

Though notable research in the agricultural field has been done at these two institutions (details in "Research in Pakistan," DAWN, 13 February 1991), and some good R&D (research and development) work at the PAEC yielded fuel for KANUPP when the Canadians backed out on their contract in the mid-seventies, the organisation appears to have failed in its prime task of providing added nuclear electricity to the country in the last two decades by not undertaking vigorous R&D towards self-sufficiency.

One sad consequence of the failing is that Pakistan is only getting less than 100 MW of nuclear electricity from its 125-MW (net), two-decade old plant, KANUPP, on its grid that has some 9,000 MW running on its high tension wires. Today, nuclear electricity's share on the power grid of the country is only about one percent.

Not one megawatt of nuclear electricity has been added since the early seventies in a country that is highly deficient in fossil fuels and has only limited hydro resources. Also there is no chance of getting any addition on that account in the next six to seven years.

The proposed 900 MW French nuclear plant and the 300 MW Chinese nuclear plant are in a negotiating stage. If at all, they will be in production only after 1996, even if they get the green signal now.

Whatever rationale comes from the PAEC in the context of nuclear electricity, is in mere platitudes and looks like an apologia to a man in the street smarting under loadshedding.

For instance, what can one make out from verbose comment in that context in PakAtom of September-October 1990 (the official Newsletter of the PAEC) about developing capability to instal indigenous nuclear plants like India or China or Brazil: "The PAEC has also given a serious thought to attempt the daunting task on its own. The ponderables have been often debated. Can the task be accomplished given the present state of our industrial development? Can the local industry play the required supportive role in this ambitious enterprise? Are our foundries, machining services, etc., geared to fabricate reactor pressure vessels, calandria and other heavy equipment? Can the experience of China, Korea, Brazil, India, be any guide? The goal seems arduous though not totally elusive. Professional candour devoid of personal prejudices and proclivities alone can decide the propitious juncture to attempt the task."

One is tempted to ask when will the "professional candour devoid of personal prejudices" in the PAEC and the debate and decide the issue.

The only conclusion one can draw from the labyrinth of the words, is lack of purpose and that no indigenous nuclear plant within this century is possible. And the only hope lies in the begging bowl stretched before foreign countries which has been nothing but a source of disdain for the last five years.

Nevertheless, R&D work in the PAEC has often been gaining in some other areas such as keeping KANUPP running after the Canadians stopped its fuel supply and spare parts in 1976.

Locally fabricated fuel bundles were pressed into service at KANUPP over a decade back even though Canadian fuel bundles in storage were also being used. Since August last, however, it is all "made-in-Pakistan" fuel that is running the KANUPP.

That is a significant achievement.

Attainment of front-end nuclear fuel cycle based on natural uranium, requires substantial R&D effort. Nuclear fuel fabrication cycle, starting from uranium dug out of the crust of the earth, its refinement and chemical processing and finally pelleting, calls for a good component of R&D, particularly in metallurgy. That KANUPP is now running on such an indigenous fuel from the uranium ore dug out from Dera Ghazi Khan, is a matter of satisfaction.

Most of the R&D work for fuel fabrication was done at PINSTECH.

"More recently, the fuel development effort has been expanded to encompass purification and production of zirconium metal to extract hafnium-free zirconium from the mineral sand found along the coast," says a report in PakAtom.

Zirconium is a key metallurgical element in the context of fuel fabrication.

Some R&D work has also been going on in KANUPP itself to make it self-sufficient.

Improving the control and instrumentation systems is the main activity. A Computer and Instrumentation Applications Laboratory is functional at KANUPP and has given good dividends. Replacement of the obsolete plant computer and control instrumentation equipment and systems is thus being envisaged.

PINSTECH, the main R&D complex of the PAEC at Nilore, has also been involved in some research projects that are significant.

One is to improve and upgrade the swimming-pool type research reactor that now is over a quarter century old.

The 5 MW reactor's capacity is being raised to 10 MW and the whole system is being modified and improved. Such a power raise should be possible by the middle of this year.

With its higher power, the research reactor should prove as a more effective tool for radioisotope production, also more useful in areas such as researches in neutron activation analysis.

PINSTECH has also been doing fruitful research in solid state nuclear track detection. In collaboration with IAEA (International Atomic Energy Agency), it was able to fabricate a highly sensitive track detecting material.

Such detectors are used in uranium exploration, in nuclear reaction studies and environmental studies.

Lately, the development of a new and less expensive technique for recovery of uranium from low-grade uranium deposits, was announced by the PAEC.

Called solution mining, holes are drilled into the ore bodies and then suitable solutions are injected through these holes. After the uranium is dissolved in the solution, it is pumped out. Uranium can thereafter be extracted through ion exchange columns.

A pilot plant in the site area in the north where low-grade uranium-bearing ore is found, has been set up. Commercial feasibility can be worked out after the pilot studies are completed.

Nuclear Reactor Operation Said Slated for August

91AS0529Z Karachi AMN in Urdu 16 Jan 91 p 8

["Nuclear Reactor Will be Operational in August, No Foreign Assistance was Required—Muneer Ahmad Khan"]

[Text] Karachi, 15 January (Staff Reporter). The chairman of the Atomic Energy Commission of Pakistan, Muneer Ahmad Khan, said that Pakistan will continue her atomic program. He revealed that a research nuclear reactor, built in Pakistan, will be operational this year by July or August near Islamabad. He ridiculed a news report that Pakistan has six atomic weapons. Speaking to a group of reporters this afternoon in a local hotel, he said that talks between Pakistan and France will start soon for a 950-megawatt nuclear power plant. Talks with China for obtaining a 300-megawatt nuclear power plant are in final stages.

About the atomic power plant in Karachi, he said that its performance has improved over last year. In 1990 about 419 million kilowatts of electricity was produced here which was sold to KESC [Karachi Electric Supply Corporation] at very low rates. He said that last year the commission earned 210 million rupees from the sale of electricity.

Answering another question about the atomic reactor built in Pakistan, he said it was completely built by Pakistani scientists and no foreign expertise was required.

Nuclear Official Claims Reactors Being Produced

91AS0598Z Karachi AMN in Urdu 17 Jan 91 p 6

[News Report: "After Manufacturing Nuclear Fuel, Pakistan is Manufacturing A Nuclear Reactor. There is an Organized Campaign Against Our Nuclear Program, But We Did Not Come Under Any Pressure—Munir Ahmad Khan"]

[Text] Karachi, 16 Jan 91 (Staff reporter) Munir Ahmad Khan, Chairman of the Pakistan Atomic Energy Commission, said that Pakistan has achieved some extraordinary successes in the manufacturing of nuclear fuel and is now manufacturing a nuclear research reactor and power generating reactors. He was addressing the opening fair for electronic equipment from China at a local hotel. He said that the Prime Minister Nawaz Sharif has expressed his determination that Pakistan will not give in to any foreign pressure or threats regarding its peaceful nuclear program. He stated that China's backing for Pakistan's peaceful nuclear efforts is encouraging and praiseworthy. China has provided a nuclear research reactor to Pakistan, and talks with China are under way for the installation of a 300-megawatt power generating nuclear reactor in Pakistan. Munir Ahmad Khan said that like China, Pakistan has also suffered losses due to the lack of nuclear technology. Our peaceful nuclear program has been viewed with suspicion and an organized propaganda campaign against us was started, but in spite of it, Pakistan remains steadfast.

Ishfaq Ahmad Appointed New Atomic Energy Chief

BK0604164491 Islamabad Domestic Service in English 1600 GMT 6 Apr 91

[Text] Dr. Ishfaq Ahmad has been appointed chairman of Pakistan Atomic Energy Commission for a period of three years.

U.S., USSR Nuclear Safety Issues Compared

914E0072A Moscow IZVESTIYA in Russian 26 Mar 91
Union Edition p 3

[Article by IZVESTIYA special correspondent A. Illesh:
"All Is Quiet on the Disaster Scale?"]

[Text] Las Vegas-Milwaukee-Moscow—In September the USSR started testing the International Scale of Incident Severity at Nuclear Power Stations (MShTSAS). In itself, this work is very important. IZVESTIYA has written on this subject before. Now, our newspaper said, all AES [nuclear electric power station] incidents are evaluated on a seven-point scale: 1. Insignificant incidents; 2. Incidents of medium severity; 3. Serious incidents; 4. AES-confined disasters; 5. Disasters involving risk for the environment; 6. Serious disasters; 7. Global disasters (catastrophes). Now the first six months of the scale "testing" are behind us. To begin with, here are the results from the specially created National Coordinating Committee on the experimental use of this scale. They are:

Total number of incidents: 134

Classification by level of severity: 0—95; 1—37; 2—2; 3 and higher—none.

Now a few words about two most serious incidents. First. On 18 September, three out of 12 safety valves in the main heat-dissipation system accidentally opened in Block No. 1 of the Ignalina AES. The radioactive steam that escaped was contained by the localization system, and therefore none of it escaped into the environment. On 9 October, fuel collectors in Block No. 1 of the Zaporozhye AES were damaged during nuclear fuel loading. Fortunately no radioactive contamination occurred; besides, the fuel was freshly produced and did not contain any byproducts of radioactive fission.

In answer to the question as to why an overwhelming share of incidents in AES operations turned out to be outside the MShTSAS scale (below Level One), Aleksandr Gorelov, deputy chief of the Main Administration of the State Committee for Safety in the Atomic Power Industry, pointed to several instances of incorrect evaluation of events. For instance, at some AES's, turbogenerators' failure was incorrectly evaluated as something that has no bearing on reactor safety. Also, some evaluations do not take into account the effect of the violations on deterioration of the quality of AES protective systems.

I will say, however, that—living as we are through the fifth year after the Chernobyl disaster—we will hardly be satisfied with this answer. It somehow comes out that an overwhelming majority of violations turned out to be something that does not deserve attention, something outside of the scale. However, according to the data from the State Committee for Safety in the Atomic Power Industry, even incidents that resulted in energy blocks being taken off line somehow got moved into this

"nowhere." Including those that took several days to fix. Examples? Here they are. On 11 January, attendants noticed an anomalous increase in pressure in the hermetization zone of Block No. 5 on the Novo-Voronezh AES. The block was taken off line. Having fixed the problem, a water test was run, in accordance with procedures, on the entire coolant circuit system. It was then that a leak in the main connector of the reactor housing was detected. The block had to be put up for repairs... Total time out of commission—20 days. On 13 February, Block No. 4 of the Zaporozhye AES had to be stopped on an emergency basis because of excessive hydrogen pressure in the electric generator gas cushion. It took 19 days to find the source of the problem and fix it....

It is not difficult to calculate the cost of this forced idling of million-watt energy blocks. By most modest estimates, the minimum is 20 million rubles. In reality, economic losses may turn out to be much greater—there are also consumers of this energy that are idling together with the idle energy block... However, this stoppage of the block (I want to emphasize that it was an emergency) did not find its place on the scale even among "insignificant incidents"—as if we are talking about an idling diesel on the farm threshing floor....

It becomes clear that out of all the types of damage an AES accident may produce, the scale only takes into account the radioactive type. It is true that radiation release is a specific feature of atomic power generation. However, there are accidents and catastrophes at the AES that do not lead to a nuclear cataclysm. One thing is clear: It is not only the excessive curies that kill people. And it is hard to call such occurrences "insignificant incidents."

The scale, however, does not supplant the criteria accepted earlier by national and international organizations.... Its purpose is to inform the population. I, for one, am confused, however, by the examples cited above: Just how objective is this new information?

Unquestionably, enormous experience of the relationship between the population and nuclear (potentially dangerous) objects has been accumulated in the country with the largest nuclear power in the world—the United States. But they do not dismiss any "trifles." To my question concerning how much money you spend on brainwashing those who live near your station, the director of the veteran AES situated right on the lake shore in Milwaukee, Wisconsin, told me: "About a million a year. But we have good, I would even say excellent, relations with the local population. That is why this figure is so low."

Other stations have more problems, therefore they spend more on public relations. But it is not just the numbers that matter. The essence of mutual understanding is in trust. And trust comes from having information. Which, in turn, must always be timely, precise, and correct.

"It is very hard to talk to a mob, to a rally," the Americans explained their position. That is why they try not to allow things to reach to that point; they go to people's homes, send out free leaflets, sponsor outdoor family picnics, pay for fishing contests, give a local school a piece of its own forested land where kids may go on field trips and study the effects of radiation on plants and animals, organize tours of the AES itself, and, of course, answer absolutely any questions about nuclear power generation.

And God save them if they lie to the public! The press will immediately make a scandal, while the courts will wield the sword of the law.

Their government programs—which in many respects are aimed at informing the citizens both of the opportunities and the dangers presented by nuclear technologies—also include support for any reasonable public movement. Any—no matter how "green" it may look to the nuclear power industry.

To find an answer to this paradox—why would the nuclear power industry dig its own grave—I asked many officials in the Nuclear Regulatory Commission and in the Department of Energy (which only goes by the title of "energy" but in reality resembles our Ministry of Medium Machine Building, or, in more modern designation, Ministry of Atomic and Electric Power Industry, and supervises both nuclear explosions and the "peaceful atom.")

Everywhere, the answer was more or less this:

"If we do not finance our opponents, we will only bring upon ourselves serious problems and fan a new public scandal; the Three Mile Island accident is a good lesson. When we pay for alternative research we get a sensible balance in public opinion and—this is also important—the results of alternative scientific research. The "greens" today are in a position to attract the best scientists as their consultants. Thus, we have several points of view on the same problem. Then we can select the best one."

This approach can be seen especially well from Yuki Mountain in Nevada, at the center of the famous nuclear test site. It is also a planned site for the storage of highly radioactive nuclear wastes. The project was started many years ago.... So why have the Americans—who, as is known, build quickly and well—got stuck? It is simple: To this day there is a debate going on in society as to whether this undertaking is dangerous. Hundreds of millions of dollars have already been spent, and, most likely, there will be billions more, all for the purpose of not only getting an answer to this question but convincing the population that the answer is the correct and sensible one.

Even we, the Soviet delegation, were attentively listened to and questioned on purely American affairs in "gay" Las Vegas, in whose backyard this grandiose grave site is being planned. "Official" scientists participated in the

debates side by side with the "public" ones, brought in to represent the "greens" interests. All this at the government's expense.

It goes without saying that I am not proposing that we idealize the American relations between the public and nuclear power departments. Not everything is smooth there. But the principal difference between their situation and the Soviet one, as Leonid Bolshoy, a neat and impassionate director of an academic institute engaged in nuclear power safety research, pointed out to me, is that the most complex issues are resolved in debates involving scientists, and not by a "street" vote. There are many explanations for this, in this scientist's opinion. But the root of the problem lies in making the population not only understand but feel the positive pocketbook impact from the nuclear power stations. One radically bent speaker from Kazakhstan was taken aback by a simple question from local journalists in Las Vegas: Does he know, as he goes on demanding the immediate closure (as he does in his home town of Semipalatinsk) of the test site in Nevada, how much income this same test site brings into the state treasury? They answered it for him: This income is second only to the income from gambling. Therefore it is hard to find serious opposition to this nuclear test site in the state of Nevada itself.... The conclusion that may be drawn from this: Both AES and nuclear explosions (we are talking about peaceful ones) are costly. Very costly. But in the final count they also bring considerable benefits.

...Yes, fortunately, the people abroad have never had a Chernobyl, thanks to which we now have a special relationship with the nuclear power industry. Therefore the criteria applied to AES safety in the USSR should be most stringent. And the scale of severity of AES incidents should be not simply an international one but quite national, all-people's. And, of course, it should preclude the possibility of misinterpretation because of omissions and innuendoes.

All nuclear power specialists should clearly understand: Only honest, complete, and accessible information may gradually "cure" the nuclear allergy with which our country is gravely ill.

Nuclear Energy Cooperation With Japan Anticipated

*LD1004133491 Moscow TASS in English
1324 GMT 10 Apr 91*

[By TASS correspondent Dmitriy Bandura]

[Text] Tokyo April 10 TASS—Nuclear energetics has excellent chances of becoming a sphere for Soviet-Japanese cooperation, according to Japanese experts. Both sides are well established in this area and are mutually interested in further progress.

"The rich Soviet experience in the peaceful use of nuclear energy is very attractive to Japanese experts. We would like to know more about it in exchange for our

achievements", Hiroshi Murata, deputy chairman of the Japanese Nuclear-Industrial Forum, told TASS.

Soviet-Japanese contacts in this sphere have been developing since an agreement on cooperation on science and technology was signed in 1973 and have already yielded results, V. Konovalov, Soviet minister for atomic energy and industry, told TASS. He took part in a conference of the forum, which is a non-governmental organization of representatives of nuclear energetics. The minister noted that the contacts were nothing more than "an occasional exchange of information", and that it is time to make them regular.

Both sides believe that the coming Soviet-Japanese summit in Tokyo will promote cooperation. Soviet President Mikhail Gorbachev is expected to sign an agreement that will make nuclear energetics a special branch of cooperation. The agreement envisages, in particular, that the Soviet Union will obtain the Japanese technology for controlling nuclear power stations and nuclear waste. The Japanese, in their turn, want to study Soviet experience in developing and creating fast reactors.

Mutual research in providing safety at nuclear power stations will be of special importance. The lessons of the Chernobyl tragedy will be thoroughly studied. The Japanese government said it is ready to help eliminate the consequences of the disaster and is contributing to the international Chernobyl fund.

The Soviet delegation at the conference proposed selling enriched and nonenriched uranium to Japan.

Hiroshi Murata said he is sure that the signing of the agreement will considerably enlarge the possibilities for cooperation in all spheres.

Entombment of Chernobyl Reactor Viewed

914E0078A Moscow TRUD in Russian 29 Mar 91 p 2

[M. Yurchenko report: "Caution: The Monster Is Only Slumbering—Scientists Protest Proposed Scenarios for Entombment of the Ruins of the No. 4 Unit at the Chernobyl Nuclear Power Station"]

[Text] A group of researchers that for five years has been engaged in finding and studying the radioactive fuel hurled out of the reactor by the explosion has turned to TRUD. These are leading experts from the comprehensive expedition organized by the Institute of Nuclear Energy imeni Kurchatov—K. Checherov, S. Ogorodnik, and V. Popov—and scientific associate from the Lenin-grad Radium Institute imeni Khlopin, L. Pleskachevskiy. They have deemed it necessary to bring to the public information about the possible consequences of entombing the unit.

It is suggested that during the explosion (in April 1986) a total of four percent of the fuel was hurled beyond the confines of the station. The rest—about 170 tons—was mixed with the construction materials fused by the high

temperatures. The lava flowed across dozens of buildings, leaked into the cavities that were formed, and penetrated into the pipelines. Today, a large proportion of the fuel has been found. However, in some buildings into which it is still impossible to venture, dozens of tons of dangerous material still remain.

At first blush the decision to raise a monolith on the ruins is the optimum one. This, people want to think, will prevent the egress of radioactive materials. In particular, radioactive dust. But others problems are arising.

The physicochemical state of the fuel mass is unstable. Its characteristics change over time, and in an unpredictable way. Whereas initially the hardened lava possessed an almost vitreous structure, almost a year ago the researchers recorded that it had started to crack and crumble, and the dimensions of the parts are shrinking. Crystals are forming on the surface of the mass—readily soluble compounds of uranium. And there are hundreds of cubic meters of water in the cavities. The largest was recently found: It contains about 500 cubic meters of radioactive liquid. Moreover, the sarcophagus is not hermetically sealed. Precipitation is entering it. All of this is promoting the solution of uranium compounds and their migration.

Will concrete entombment halt these processes? Probably not. Concrete is a porous material that is permeable to water. Even if we assume that a special material with extraordinarily high viscosity can be developed for the entombment, a material that when it hardens acquires an impermeable vitreous structure, it will still be lying on the concrete that was melted in 1986.

In short, it will not be possible to stop migration of the fuel beneath the sarcophagus. In this case, what can we expect? The calculations and the observations now show that the thermal physical state of the fuel gives no cause for apprehension, and the situation is being constantly monitored. But beneath a heat-insulating concrete cushion, heating is positive. As the temperature rises it is quite likely that phenomena will occur that have been called "the China syndrome"—when hot masses start to leak downward, burning everything in their path. This can be avoided if the entombment is started not now, as is being proposed, but no earlier than 1992, when the intensity of the heat being given off will have been reduced.

S. Ogorodnik and V. Popov believe that the danger of a nuclear threat is quite possible. Several million years ago in Africa, at a site rich in uranium compounds, the compounds washed down and concentrated in a single part of a subterranean system. There, it reached critical mass. In the natural nuclear reactor that had been formed, a self-sustaining chain reaction was initiated. The same kind of situation may occur in the No. 4 unit.

While it is open, the fuel masses are under control. In a worst case scenario the so-called geyser effect is possible—a localized explosion. A number of means exist to suppress it, including a solution containing absorbent

particles. But a concrete envelope, if it were made, would make it impossible to use them. According to calculations done by a leading section at the Belorussian SSR Academy of Sciences Institute of Atomic Physics by G. Sharovarov, several dozen critical masses might form beneath the monolith. The neutron burst resulting from their "excitation" is even capable of reaching the same power as in 1986.

Even if all these suggestions are rejected, a decision to effect entombment will, in the opinion of many scientists, still be hasty, to say the least. While the unit remains accessible it is still possible to continue research on the true causes of the accident. Up to now not one hypothesis for the catastrophe has been confirmed. After entombment it will remain a secret forever. This will do irreparable harm to world research on the physical and technical causes of the accident at the nuclear power station, and to the search for ways to prevent them and eliminate the consequences. And in the final analysis it will cast doubt on the prospects for the development of nuclear power engineering.

The scientists are convinced that total isolation of the unit will not simplify but complicate the tasks of our successors. Sooner or later the radioactive ruins will have to be disposed of. The construction features of the unit make it impossible to turn it into a tomb for the long-term storage of dangerous waste. But the entombment plan being proposed fails to make provision for technology to dismantle the monolith.

And a final consideration. No matter how broad the range of experts and scientific collectives engaged in preparing projects for entombment, this kind of decision cannot be taken at the level of a department. The consequences of the catastrophe that occurred were global in nature. Scientists working at Chernobyl remember this and are calling publicly for discussion of the proposed projects and competent expert assessments to be made by scientists from the Ukraine, Belorussia, and Russia, and also representatives of world science, including the International Atomic Energy Agency.

In an issue very soon we shall be talking in detail about the researchers of Chernobyl who are working in the sarcophagus.

Measures Against Chernobyl Radiation Hazards

LD0504202891 Moscow TASS in English
1756 GMT 5 Apr 91

[By TASS correspondent Veronika Romanenkova]

[Text] Moscow April 5 TASS—Although the effect of the 1986 Chernobyl nuclear accident are still felt, a complex of technical and hygienic, medico-biological, agrotechnical and organisational measures taken over these years made it possible to prevent radiation hazard for people inhabiting the contaminated territory, professor Usher Margulis, expert of biophysics institute, told TASS.

The assessment of the possible level of irradiation showed that some 280 thousand people residing in zones of rigid control received an average individual dose of external and internal radiation of 3.5 rem in 1986-1989. In 80 per cent of the population, the individual doses of radiation do not exceed five rem, and in only four per cent of the population amount to 17.3 rem (the maximum permissible dose over these years), Margulis said.

The zone of rigid control spreads over the Bryansk, Mogilev, Kiev, Zhitomir and Gomel regions where the density of radioactive contamination surpassed 15 curie per one square kilometer.

Asked how harmful this irradiation is, Margulis said that there can be some 200 cases of malignant tumours among residents of this area in the lifetime of the present generation.

However, there are 2,000 spontaneous cases of cancer per one million people every year. The level of remote consequences is so small that cannot be established against the background of spontaneous malignancies.

Radiation safety of people was achieved by a number of measures that substantially altered their activities. This complicated the conditions of residence in contaminated districts and took a toll in stress. The professor spoke highly of the government programme for the normalisation of activity in zones of rigid control and lifting of all restrictions. He said scientific analysis shows that there are no reasons for restriction when lifetime radiation doses make up 35-70 rem.

Construction of 60 Nuclear Power Plants Halted

LD0404085991 Moscow World Service in English
1600 GMT 3 Apr 91

[Text] The Soviet Union has stopped the construction and designing of about 60 nuclear power stations. The power industry ministry has said that this is a result of the anti-nuclear movement following the Chernobyl nuclear power plant accident. However, experts have said that the public's attitude to nuclear power has been changing somewhat. In connection with the serious power shortages in a number of regions of the Ukraine and Russia, the local authorities have had to resume the construction of advanced safety nuclear plants.

Nuclear Waste Reportedly Stored on Kildin Island

AU0204115391 Cologne Deutschlandfunk Network
in German 1100 GMT 2 Apr 91

[Text] According to information from the Norwegian environmental foundation Benona, the Soviet Union is storing nuclear material from nuclear-driven submarines on the island of Kildin off the coast of northern Europe. Norwegian radio stated today that environmental activists have verified information provided by a KGB officer at a meeting at the beginning of this year. This is the fifth

waste disposal site that has become known in this region. The authorities in neighboring Norway were not officially informed.

Reports of Nuclear Test Site Near Perm Denied

LD2503133791 Moscow All-Union Radio First Program Radio-1 Network in Russian 0700 GMT 25 Mar 91

[Summary] An OGONEK report that a nuclear testing ground is being built in the north of Perm Oblast has

caused much alarm. The head of Perm Oblast KGB (Vakhamanin) says it's a crude fabrication. Oblast military Commissar Samoylov says there are no military construction units in the areas mentioned by OGONEK. No such site is being built, or could be, because of the region's geographical situation, says the chief of staff of civil defense in the oblast, Meshochkin. One can only wonder how it was possible for unchecked information to be published in the magazine, our correspondent notes.

FRANCE

1991 Atomic Energy Commission Budget Presented

91WP0076A Paris *LE MONDE* in French
13 Mar 91 p 56

[Article by J.-P.D.: "Nearly 20 Billion Francs for 1991; Transition Budget for Atomic Energy Commission"]

[Text] With a total of 19.82 billion francs [Fr], the Atomic Energy Commission (AEC) budget for 1991 shows a very slight increase over the 1990 budget. While the portion allocated to military activities (Fr9.916 billion, 99.4 percent of which is provided by the state) is reduced by 0.6 percent, the civil budget (Fr9.914 billion) is increased by 3.3 percent. In the civil sector, revenue from foreign sources is increased by 7.7 percent (and by 40 percent since 1985) to attain a figure of Fr3.640 billion.

It was a transition budget that AEC general administrator Philippe Rouvillois presented on 11 March. Faced with a slowdown in its nuclear electric power program—in France as in most of the industrialized countries—this agency, which employs nearly 20,000 people, has set about finding a new balance. A readaptation launched with much fanfare last year with the publication of a report on AEC "research objectives" less than a month after the launching of an important AEC structural reform (*LE MONDE* 17 May and 23 February 1990). "After defining our objectives, we have today come to the time to make choices. From now on, it is up to the state to make long-term financial commitments that will permit the AEC to advance. The moment of truth could be here before this summer," Mr. Rouvillois thought.

Meanwhile, the AEC goes on with its diversification. The advanced technologies (microelectronics, optronics, automation, etc.) benefit from Fr1.172 billion (11.4 percent of the increase). In the field of basic research, on the other hand, the increase in credits is smaller, even a bit lower than the increase in the cost of living: 2.7 percent for the physical sciences (Fr1,597.4 million) and 2.1 percent for the life sciences (Fr360.1 million).

Similarly and in keeping with the objectives defined in the May 1990 report, "studies for the future" of nuclear energy retain an important position. The sums allocated for the improvement of environmental protection and safety programs (Fr999.4 million) have been increased by 2.9 percent and those destined for the development of future reactors (Fr1,152.1 million) have been increased by 2.8 percent. And lastly, Fr1.6 billion (up 4.5 percent) have been allocated for research on the fuel cycle: enrichment of uranium by means of lasers, high-efficiency reprocessing of irradiated fuels, and storage of highly radioactive waste.

On this point, Mr. Rouvillois declared that he fully agreed with members of Parliament and the public on the prevention of technological risks, for which research

efforts should be first of all aimed at reducing the volume of nuclear waste and diminishing the halflife of "long-lived" elements, which remain dangerous for thousands, even millions of years.

GERMANY

Stoltenberg: U.S. Nuclear Presence Necessary

AU1104122191 Hamburg *DIE WELT* in German
11 Apr 91 p 10

[Ruediger Moniac report: "U.S. Nuclear Presence in Europe Required"]

[Text] Bonn—On the eve of his trip to Washington, Defense Minister Gerhard Stoltenberg gave a speech in which he tried to dispel U.S. concerns that, as a result of the process of its political unification, Europe might underestimate the future role of the United States on our continent. With his speech, Stoltenberg, who is currently chairman of the European defense ministers within NATO, responded to a U.S. demarche addressed to the group of European NATO nations and made it clear that Europe, which is developing a new security policy, will only remain able to balance the future military-strategic capabilities of the USSR in cooperation with North America. Thus, the "substantive conventional and nuclear presence of the United States in Europe will continue to be necessary."

Stoltenberg, who will meet with his counterpart Cheney and probably also with President Bush in Washington, stated in Bonn that security in Europe "must never be defined exclusively in European terms." NATO has to fulfill stability-related tasks that go beyond its area. It is in the interest of the European partners "to fully involve the United States in European affairs on an institutional basis." However, he also said that it would be "desirable" if the United States "would open itself up to a greater extent to Europe."

According to Stoltenberg, the internal developments in the Soviet Union are the biggest problem for European stability. While the process of democratization is slowing down, "conservative forces awaken again that are prepared to use military means previously thought to be no longer possible to solve domestic problems." The minister warned that the Soviet Union, despite the fact that it experienced its worst economic crisis since World War II in 1990, spent an "disproportionately high share" of its financial and productive strength on its Armed Forces. He called on Moscow to unconditionally respect the Treaty on Conventional Stability in Europe signed in November 1990, because only "full loyalty to the agreement and mutual confidence" allow the continuation of disarmament in Europe.

Former Soviet Missile Site Declared Unsafe

LD1104164591 Hamburg DPA in German 0737 GMT
11 Apr 91

[Text] Rosslau (DPA)—A former Soviet Army training ground near Klieken (district of Rosslau) has been declared a danger zone, it was announced by Saxony-Anhalt's Interior Ministry today in Magdeburg. According to reports, "mines and munitions were probably placed in landfill sites" on the former training ground. In addition, numerous open bunkers, shafts, and ruined buildings are present.

The territory, which was abandoned by the Soviets at the end of last year "without the deregistration required by the German authorities," according to the Interior Ministry, has been inspected during the last few days by representatives of the local council, the Army, the forest administration, and the police, following reports from local residents. The area, which is now closed off, was used as a missile site by the Soviet Armed Forces.

On Tuesday, antitank grenades, bombs, and tank and machinegun ammunition was discovered near a Soviet barracks in a wooded hollow in the Stendal District, near Staats. Over the previous few days the discovery of munitions near Rosslau and Gardelegen has also caused concern among the local residents.

Israelis Confirm Germans Did Not Improve Scuds

LD2003231191 Hamburg DPA in German 1756 GMT
20 Mar 91

[Text] Hamburg (DPA)—According to Federal Minister of Economy Juergen Moelleman (FDP) [Free Democratic Party], the Israeli intelligence service has confirmed that the range of the Iraqi Scud missiles was not extended with the help of the Germans. Moelleman said to the daily newspaper DIE WELT (tomorrow's edition): "The Israeli account is certainly not a general certificate of blamelessness, but it shows that one does not have to believe every criticism," the minister said. During the Gulf war, German enterprises were suspected of having broken the embargo against Iraq.

The interview was given to DPA in an edited version.

SPIEGEL: Arms Sales to Iraq Flourished

LD0704130191 Berlin ADN in German 1215 GMT
7 Apr 91

[Text] Bonn (ADN)—According to a report in the news magazine DER SPIEGEL, legal as well as illegal exports of weapons and armaments to the Saddam Husayn regime have been flourishing under the liberal economics ministers of recent years. The magazine reports in its issue to be published on Monday that "benevolent approval practices and lax controls" by the Economics Ministry and the Federal Office for Industry, of which the former is in charge, made things easy for the death

merchants. It quotes a confidential paper of the Economics Ministry concerning German arms exports to Iraq, which the lower house Economics Committee has in hand.

In the past 10 years Bonn approved arms exports worth about 1.3 billion German marks [DM] to Saddam: pistols and ammunition, explosives and radio equipment, radar equipment and computers, machinery and vehicles. What was especially embarrassing was that exports to Iraq carried out under section D of the export list and worth DM3.9 million were approved as recently as 1990, and that they were "for chemical plants and chemicals which, according to the Federal Office for Industry's definition, 'are suitable for the production and disposal of chemical warfare agents'."

The biggest item appeared in the official export list not as FRG deliveries: world wide sought-after German-French productions such as the "Roland" air defense missile and the "Hot" and "Milan" anti-tank systems were supplied via the French "Euromissile" sales firm to Iraq. According to the firm's German arms partner MBB, DER SPIEGEL writes, a total of 19,870 missiles were involved.

Details of Ministry Report on Arms Sales to Iraq

AU0804195491 Hamburg DER SPIEGEL in German
8 Apr 91 pp 28-29

[Unattributed report: "Supplies for Saddam"]

[Text] Economics Minister Moelleman made gloomy remarks at a session of the Presidium of the Free Democratic Party of Germany [FDP]. "Some of the former economics ministers do not appear in a good light," he stated when arms exports to Iraq were discussed.

He did not mention any names. However, it was clear to the FDP Presidium who the new minister who wants to do better than everybody else was thinking of: His predecessors Otto Graf Lambsdorff, Martin Bangemann, and Helmut Haussmann, who are members of the FDP.

Moelleman knows what he is talking about. The Economics Committee of the Bundestag has had in hand a report compiled by the Economics Ministry on German weapons exports to Iraq since Easter. The document that comprises 64 pages ("classified document kept secret for official reasons") shows that both legal and illegal exports of weapons and armaments to the regime of Saddam Husayn flourished under his liberal predecessors. Benevolent approval practices and lax controls by the Economics Ministry and the Federal Office for Industry (BAW), of which the former is in charge, made things easy for the death merchants. Renowned German concerns and smaller enterprises deceived the government's control organs regularly with hair-raising tricks.

The document seemed so explosive to all parties concerned that it was immediately declared confidential.

Only members of the Economics Committee were allowed to read the document but were supervised. The people's representatives were not permitted to make notes, let alone photocopy the document.

"Everyone who receives the report is especially obliged to maintain confidentiality," the economics minister told Friedhelm Ost, the chairman of the Economics Committee and former spokesman for Chancellor Kohl, in a letter. Otherwise current investigations and the reputation of innocent companies would be endangered. However, it is probably the reputation of Bonn politicians that might be affected. There is hardly any evidence of Moellemann's obligatory positive statements ("The government's approval practices for weapons exports to the Near and Middle East region were particularly restrictive.") in the report. Quite the contrary: Bonn permitted weapons exports worth 1.3 billion German marks [DM] to Saddam. The exports included pistols and ammunition, explosives and radio equipment, radar devices and computers, machinery and vehicles.

What is particularly embarrassing is that exports to Iraq carried out under Section D of the export list and totaling DM3.9 million were approved as recently as in 1990—for chemical plants and chemicals that "are suitable for the production and disposal of chemical warfare agents," according to the definition of the BAW. Thus, German industry possibly supplied material for Saddam's poison gas plants.

The most important item on Moellemann's official export list does not appear as a West German delivery: Worldwide sought-after German-French productions such as the "Roland" antiaircraft missile and the "Hot" and "Milan" antitank systems were supplied to Iraq through the French "Euromissile" company. According to the German partner Merserschmidt-Boelkow-Blohm, a total of 19,870 missiles were involved.

The trick is very simple: In a government agreement concluded in 1972 Bonn and Paris agreed to interpret and apply their countries' weapons export law "in the spirit of German-French cooperation." Under SPD [Social Democratic Party of Germany] Chancellor Helmut Schmidt the Federal Government stipulated in 1982 that German parts for "Roland," "Hot," and "Milan" that were incorporated in the weapon in France "will be treated as goods of French origin." They simply turned into French parts that are not subject to German export control. Thus, German consciousness remained unburdened.

If ministers and state secretaries "gave priority to cooperation interests" over exports controls (Moellemann report), it is not surprising that government representatives in authority were rather generous. The BAW issued clearance certificates ("negative certificates") for weapons exports quite easily under Economics Ministers Lambsdorff, Bangemann, and Haussmann.

A particularly embarrassing example mentioned in the report shows where that practice led: In November 1989 Greens Deputy Vera Vennegarts asked the government about alleged export permits: The Ferrostaal company allegedly received permission to export a gun factory to Tadjik. The government immediately denied everything.

However, officials in the Economics Ministry finally had a suspicion. They compared all the negative certifications that they had generously issued for Ferrostaal. What they discovered suggested that the smart businessmen had split up a deal that was subject to permission into individual parts that were not subject to permission.

Now that they had awakened, the officials got the idea that the Thyssen concern had deceived them as well. Thyssen applied for the export of a similar plant—also in Tadjik—in 1989, during Haussmann's term of office. The mere affirmation by Thyssen officials that the plant was not built for specifically military purposes was sufficient for the BAW to grant the required permission, the report says. Meanwhile, the controllers "have gathered evidence that speaks against the civilian use of the plant and for its use for the production of guns."

It has turned out that the credulous BAW officials had bad luck with the Thyssen Maschinenbau company as well. The company concluded a contract with Iraq to deliver turbo pumps and applied for a negative certification. By June 1990 it had begun to dawn on the BAW officials that the certification "may have been obtained through false indications and the presentation of modified documents."

This is a mild formulation. The Thyssen officials blackened parts of the documents needed for the application, without the BAW noticing it, Moellemann's report stresses. The Federal Office of Criminal Investigation made the writing visible again. "Fuel" and "oxidizer" were supposed to flow through the Thyssen pumps. "That made it clear that the turbo pump units in question were especially constructed for use in missiles," the report reads.

According to the report, sloppiness in Lambsdorff's Economics Ministry was to blame for the fact that Saddam was able to work unimpeded on his "Saad 16" development center for many years. The general contractor, the Bielefeld-based Gildemeister Projekta company, received several negative certifications from 1983 onwards and a total of 52 export permits during Lambsdorff's and Bangemann's terms in office. The simple assertion that a research project of Mosul University was involved was sufficient. It was only in 1987 that Bonn woke up and refused to grant further permits.

As a matter of fact, as early as in 1982 the Economics Ministry received hints that "Saad 16" was to become a military facility and that Gildemeister wanted to participate. Moellemann's report refers to the sloppiness during the term of Lambsdorff, who is now FDP

chairman, in the following way: "This early correspondence was not available to the BAW for examinations in the years 1983-85."

What happened in connection with the granting of export permits makes one thing clear: The government's arms export controllers did not carry out strict controls until—mostly foreign—secret services suggested that something was wrong with their customers. The Federal Government did not act before damage was caused.

Moellemann has now announced tough measures against shady export deals. Bonn has received 137 hints that FRG companies allegedly violated the UN embargo against Iraq. According to the secret report, legal investigations have been started against the Tellkamp Engineering company in Muehlheim, for example, because it is suspected of having supplied artillery ammunition to Iraq.

Minor offenses were also discovered in the course of investigations. A company from Hannover, for example, is facing monetary fine proceedings. It allegedly planned to sell an "industrial vacuum cleaner worth DM10,000" to Iraq despite the embargo.

Fast-Breeder Nuclear Reactor Project Abandoned

*LD2103150291 Hamburg DPA in German 1136 GMT
21 Mar 91*

[Excerpt] Bonn (DPA)—The 7 billion German mark [DM] fast-breeder reactor in Kalkar will not be commissioned. Research and Technology Minister Heinz Riesenhuber, the Operating Company (SBK), and Siemens AG company—whose subsidiary KWU [Kraftwerk Union] was building the controversial reactor—has made that decision. Riesenhuber, who announced that to the press on Thursday after weeks of negotiations, said that the reactor could possibly be converted into a conventional oil-fueled power station. The Bonn Social Democratic Party spoke of a "declaration of bankruptcy" by the research minister.

The minister on the other hand blamed the final cancellation, which had been expected for months, on the North Rhine-Westphalian Government. No one could any longer expect a successful conclusion to the licensing procedure that the land government was to carry out, a statement from the research ministry says. The project, which was begun in 1973 and was financed with almost DM4 billion in taxpayers' money, still needs a final phase construction license and a license to allow the fuel elements to be inserted. [passage omitted]

Missile Launcher Export to Iraq

*AU2603122291 Hamburg DER SPIEGEL in German
25 Mar 91 pp 130-132*

[Unattributed report: "The Secret of the Apartments"]

[Excerpts] Suspicion is increasing that Daimler-Benz was involved in shady dealings. The public prosecutors

discovered two apartments where company files were stored. The Federal Intelligence Service gave hints to the Bonn government as early as January that Iraqi surface-to-surface missiles were transported on Mercedes trucks. [passage omitted]

These events are certainly distressing for the head of the Daimler concern, Edzard Reuter. Accusations that senior officials enriched themselves are unpleasant enough for the moralist Reuter. However, the suspicion that the concern illegally exported trucks, which is being investigated by the Public Prosecutor's Office, is probably really painful for him.

"We have supplied no armored trucks to anybody, only normal trucks for civilian purposes," Reuter stressed. This statement, however, is very dubious.

Legal proceedings have been initiated against the Mercedes partner Marrel. It might now be extended to the Stuttgart-based Mercedes concern, because Mercedes is the general contractor.

According to its own statements, the company delivered 26 vehicles, type MB 3336/A, to Iraq until the middle of July 1990. Mercedes built the tractor trucks, and Marrel, a subsidiary of the French Benne Marrel concern, produced flat-bed tractor trailers with special equipment, including hydraulic devices.

The investigators suspect that the heavy-duty vehicles were destined to be used as mobile launching platforms for Scud-B missiles in Iraq.

According to official information, the vehicles were to be used for the transportation of crane retrievers. No export permit was required because of the planned civilian use. Company spokesman Matthias Kleinert stressed that it was also possible to transport carrots, and that it was not possible to bring Scuds into position.

Important details of the contract speak against Kleinert's version. The documents seized at the Marrel company contain numerous references to Project 144—the code for the Scud-B program.

On 30 June 1989 the contract covering the trucks was concluded between Mercedes and the "State Organization for Technical Industry" (SOTI), which is a department of the war ministry in Baghdad.

Last week new details of the deal became known. According to these findings, the Iraqi company Technical Corporation for Special Projects (Teco) was involved. Teco is headed by Husayn Karmil, minister of military industrialization and Saddam Husayn's son-in-law.

Karmil was in charge of all major military projects in the country, including the development of the supergun and the Scud Program 144.

The contracts concluded by Mercedes contain the term "noncivilian version" at various points. All tractor trucks are fitted with "slewable roof opening" on the side of the co-driver.

This means something to experts. For years the war ministry in Baghdad ordered sand-colored trucks with roof openings for submachine guns. The 26 Mercedes-Marrel vehicles were also ordered with "special matte sand-colored coating."

According to the Daimler managers, the roof opening cannot be seen as proof of the military use of the trucks. Round holes are also cut into civilian vehicles. For submachine gun stands the roof must be more stable than normal roofs. However, this was not the case with the trucks for Iraq.

Even with small details, such as the trailer coupling, the customer from the Middle East accorded great value to the correct equipment. The contract clearly speaks of "military type" equipment.

The secret services discovered some time ago that something was wrong with these deals. On 16 January, the Federal Intelligence Service (BND) drew the government's attention to the exports by the Stuttgart and Wuefrath companies.

According to a confidential document, Marrel supplied trucks to Iraq "that might be used as launching platforms for surface-to-surface missiles," and which "presumably belong to Project 144," the Scud program. The tractor was produced by Daimler Benz and the flat-bed trailer by Marrel, the intelligence agents claimed.

One can proceed from the assumption that the final destination of the vehicles was covered up, "despite the fact that those involved must have known about the actual use."

Despite the clear references to the military version and the transportation of Scud-B missiles, the investigators might be facing difficulties. On the basis of the lax German laws, the prosecuting authority must now prove that the vehicles were constructed especially for military use in Iraq. References in contracts and drawings might not be sufficient.

However, the Iraqi deals and exports by the Mercedes concern to other Arab states might not be compatible with Reuter's noble principles.

The public prosecutors are investigating three export deals of the Stuttgart-based company, which are believed to have been carried without export permits. Thus, 85 3250-AS-type trucks were allegedly delivered to Kuwait, 150 3850-AS-type trucks to Abu Dhabi, and 70 trucks of the same type to Yemen.

Nobody will believe the arguments of the Mercedes managers that simple transport vehicles, suited for the transportation of harmless goods, were involved. The

investigators are in the possession of a brochure ("Mercedes-Benz Military Vehicles"), in which the range of military products is described in detail.

The standard Mercedes vehicles "have been modified for military purposes," the leaflet reads. It is exactly the models that Mercedes exported to Kuwait, the United Arab Emirates, and Yemen that are presented in the brochure as "Mercedes-Benz military vehicles."

There are numerous innuendos and accusations. At the moment, the investigators are busy emptying the crates with the confiscated files and examining the material. However, the suspicion—violation of the arms export law by the company, the illegal pocketing of commissions by individual employees—is a serious burden for the concern and has already damaged the reputation of the Mercedes-Benz automobile concern.

In view of this, the trip that the head of the Mercedes concern, Werner Niefer, made last Thursday [21 March] may have provided some consolation. Over 1,000 managers who were polled last fall by MANAGER MAGAZINE rated the auto manufacturer as the number one among the most renowned enterprises of the German industry.

At Hamburg's "Four Seasons" hotel, he received the prize "Image Profiles 91" with a mixture of pride and embarrassment.

Wismuth Radioactive Waste Removal Costs Reported

AU2803104591 Cologne Deutschlandfunk Network in German 1000 GMT 28 Mar 91

[Text] This year alone, the removal of the waste caused by the Soviet-German joint stock company, Wismuth, costs 830 million German marks. As the Federal Government reported in answer to a question from the Alliance 90/Greens group in parliament, this amount is above all intended for the disposal of the nuclear waste of the open uranium mines, in order to avoid the contamination of the ground water. Before the end of the year, the dismantling of the installations and the demolition of radioactively contaminated buildings will also be initiated, it was stated.

ITALY

Research on Nuclear Energy Intensified

Nuclear Energy Committee

91M10178A ITALIA OGGI in Italian 10 Jan 91 p 33

[Interview with Professor Umberto Colombo, president of ENEA, by ITALIA OGGI; place not specified; first two paragraphs are ITALIA OGGI introduction]

[Text] Italy's energy bill is growing due to the Gulf crisis. While Italy acquires electricity and fuels abroad, safety

technology for atomic reactors is being refined and new techniques for the treatment of fission waste are being developed. A consortium has recently been established (Ansaldo, Fiat, ABB) to develop a more intrinsically and passively safe reactor.

In light of these new elements, has the time come for Italy to talk over nuclear energy again? We asked Professor Umberto Colombo, president of ENEA (National Committee for the Research and Development of Nuclear and Alternative Energies), the institute which oversees energy research in Italy. In brief, Colombo proposes exploring the whole sector.

Three Recipes: Savings, Coal, and Natural Gas

[Colombo] I believe that the Gulf crisis and the threat of future crises, the concern of the over heating of the Earth's atmosphere due to the greenhouse effect, and Italy's excessive dependence on imported energy, especially petroleum, will oblige us to adopt a well-defined energy strategy to recover from such a vulnerable situation. First, we must focus on saving energy by promoting less energy-intensive industrial production.

There should be a greater use of natural gas and carbon among the fossil fuels, so as not to produce more greenhouse gas than the current mix. We must also speed up the penetration of renewable energy sources, taking advantage of the high energy costs. Finally, nuclear research should be intensified. After the stall brought about by Chernobyl, this can return in Italy, with a new generation of reactors that can clearly be demonstrated as having a safe, reliable performance.

[ITALIA OGGI] Mention has been made of "safe" or "safer" reactors for some time now. Two are currently under study in the United States. However, attention currently focuses on the Swedish PIUS [expansion unknown]. Professor Colombo, can this reactor be proposed to the general public?

[Colombo] We have launched joint ventures (involving Italian industry) with General Electric and Westinghouse in the United States and with ABB Atom in Europe. The two American companies are developing a boiling water reactor, and the AP-600 pressurized water reactor respectively. Both are of medium size (600 MW), with extremely more simplified plants, and decidedly innovative solutions where safety is concerned.

ABB Atom is currently studying PIUS, which is a pressurized water reactor. This is an entirely new concept where safe operations are based on the reactor's inherent self-adjustment capacity without requiring active intervention systems. The distinguishing feature of the PIUS project is the immersion of the core and the entire primary circuit in a cold tank at the same pressure as the refrigerating circuit. This solution eliminates the problem of a breakdown in the primary circuit at the source. The reactor's emergency shut off is guaranteed by the spontaneous entry of borate water into the core

which generally occurs in disturbed conditions of any kind. This element confers a high degree of intrinsic safety to the whole project.

The principle has met with the approval of scientists and the theoretical project has been judged worthy of development. However, it will be necessary to demonstrate that the reactor can work without too many stumbling-blocks. To prove this, a prototype must be built to demonstrate the plant's feasibility and working capability.

The International Energy Agency in Vienna is proposing smaller, passively safe reactors with containment dikes to block radioactive emissions (or leaks in irrelevant quantities as far as health is concerned) even in case of serious accidents, as the path toward "new nuclear energy."

Decrease Accidents, Avoid Evacuations

[ITALIA OGGI] But is this the right path?

[Colombo] On the one hand our approach aims to drastically reduce the risk of a serious accident occurring within the reactor by introducing simplified plant operations and a high degree of intrinsic and passive safety. On the other hand, we are trying to develop a containment system that can contain the radioactivity freed from the fuel within the reactor itself, even in case of serious accidents (including the fusion of the core). Outside, therefore, there would be no appreciable radioactive consequences at all. In other words, it would not be necessary to evacuate the population and the territory and agricultural products would not be contaminated. This last feature definitely represents the major safety goal that we wish to achieve with new nuclear technology, and it is a goal that holds particular importance in a country as densely populated as Italy.

[ITALIA OGGI] In other words, has the time come to appeal for a new trial on nuclear energy?

[Colombo] An immediate return to nuclear energy in Italy seems rather improbable. I do, however, emphasize the fact that whatever the political decision on present day power plants, our research focuses on new generation reactors. Within three years, the program now under way should enable us to choose the reactor model on which to concentrate our development efforts. The subsequent program, which can be formulated only hypothetically at present, could lead to the definition of a detailed plant project by 1996, and the development of the first in a series of power plants in the following six or seven years. After all a construction plan for new generation nuclear power plants in Italy could reasonably be launched at the beginning of the next century. The temporary outlook for fusion, however, is much further ahead than for new generation reactors. We feel that a commercially competitive prototype of a fusion reactor will be possible in the year 2040. This is a very long term goal but one that needs to be pursued with determination.

Research on soft energy, defining the rules for the use of fossil fuels, and more studies on sophisticated nuclear energy, without giving up the idea of creating fusion, are a distant hope, but not a dream. These are Prof. Colombo's practical recipes for Italy, which cannot allow itself to be kept in the dark. However, among the many problems, this is also a simple but severe appeal to save energy. Italy, turn off that light.

Electric Power Company

91MI0178B ITALIA OGGI in Italian 10 Jan 91 p 33

[Text] Love you, hate you. Fortunately, this is no longer so: the nuclear issue is no longer a matter of irreconcilable hate or blind faith, at least not like it used to be. Reactors proliferated in Italy as in a large part of the world, working quietly until the Three Mile Island and Chernobyl accidents.

These were, however, useful experiences. No longer could we accept the construction of atomic reactors as they were conceived of in the past. However, Italy's energy problems have remained essentially the same as they were in 1987, the year of Italy's big "no" in answer to the referendum on nuclear energy. Perhaps, these problems have even worsened. Our dependence on energy supplies is increasing and our electricity requirements have grown by 4.9 percent. Furthermore, 15 percent of our total energy supplies comes from abroad.

So, what should we do? We spoke with Professor Giovan Battista Zorzoli, an expert on energy problems and a member of ENEL's [National Electric Power Company] board of directors. He stated that the "new nuclear energy" is interesting. "ENEL has just set aside 70 billion lire over the next three years for research in the field of passively and intrinsically safe reactors. There are three main areas to explore here," he explained. "The first two are the two reactors under study in the United States and the third is the PIUS [expansion no given] project, which has been spoken of in recent days. At the end of the three years, perhaps we will be able to choose one of the three possibilities and decide on further developments."

But how can we overcome the "no" Italy gave to nuclear power with the referendum? "The generation of reactors we are now talking about, unlike the obsolete ones that have been closed down, will avoid the need for the evacuation of the population. Of course, accidents cannot be avoided. Radioactivity leaks from the power plant will, however, be excluded. Perhaps this will not change any ideological opposition, but it may change the degree of acceptance.

"On the other hand, even the Greens have very precise positions today. Therefore, not just any product will be proposed. The possibility of recycling fission products in those plants where they are produced is being examined. I would also add that these proposals are not going to be developed tomorrow, or the day after, but on the

dawning of the year 2000." What energy must we therefore use from now until the end of the century? "A large deal of methane gas," Zorzoli explained, "petroleum with a low sulphur content, and a little coal with geothermal and hydroelectric energy being developed to the maximum."

Professor Sergio Barabaschi in charge of Ansaldo's research and the vice director of this large Genoa-based company which is strongly committed to the energy sector, explains that the studies on the PIUS project will be further investigated by the ABB-Ansaldo-Fiat consortium: "PIUS has many intrinsic safety features with interesting solutions, and meets the requirements dictated by Fermi: It is immersed in a pool of water and boron that can prevent combustion. There is also an intrinsic pressure-balancing mechanism so that any change whatsoever in optimal conditions automatically brings about the shut down of the reactor."

New scientific arguments, therefore, against consolidated positive experiences and against the fears that grew from two serious accidents, Chernobyl and Three Mile Island. There are many other problems, minor ones fortunately, that it would take too long to list here. The nuclear question is opening up again. Let us listen.

NORWAY

Soviet Nuclear Waste Storage on Kola Deplored

LD0304155491 Helsinki Domestic Service in Finnish 0900 GMT 3 Apr 91

[Excerpt] [Announcer] New information has come to light in Norway about Soviet nuclear waste storage on the Kola peninsula. According to the Norwegian environment organization [Bellona], the Kola peninsula is a ticking time bomb because of nuclear waste from the Soviet Navy and outdated nuclear submarines. From Oslo, Ulla-Maria Johansen reports:

[Johansen] According to the newest information from Bellona, the Soviet Union has stored large amounts of nuclear waste from high octane nuclear submarines in front of Murmansk on the island of Kildin about 120 kilometers from the Norwegian border. According to Bellona, the nuclear wastes have been placed in corridors dug inside a mountain, from which they can escape to the Barents Sea and damage the fish stock in the area.

Knut Gussgaard, Norwegian Nuclear Observation Department director, and other Norwegian authorities say that they have no knowledge of the storage on Kildin island. However, the environment organization Bellona claims that the KGB confirmed the existence of these stores as early as last January. In addition to using Kildin island, it claims that the Soviet Union has stored nuclear waste—which is damaging to the environment—even closer to the Norwegian border, to Kilpyavr. According to Bellona, radioactive waste from nuclear icebreakers

has been stored here. Bellona proposes forming an independent international inspection committee to inspect the security of Soviet nuclear waste storage and it also proposes cooperation with Soviet authorities. [passage omitted]

SWEDEN

Poll Surveys Views on Nuclear Power

91WP0071A Stockholm DAGENS NYHETER
in Swedish 8 Mar 91 p 12

[Report from TT (Wire Service, Inc.): "Increased Support for Nuclear Power"]

[Text] Support for nuclear power continues to increase, even though a majority of the Swedish population still wants to phase it out. These are the results of the latest

public opinion poll on nuclear power from the Institute for Political Science at Gothenburg University.

The poll, which was taken last year, surveyed just over 1,500 people. A comparison with results from the previous year indicates that the group consisting of those people who want to phase out nuclear power by 2010 or sooner has diminished.

29 percent want nuclear power to be phased out after 2010, while almost the same number, 27 percent, do not want nuclear power to be phased out at all. Both of these views have gained several percentage points of increased support over the last year.

The percentage of people who are undecided with respect to the nuclear power issue is greater than before, 16 percent.